Ontario Geological Survey

Report 167

Geology of the

Tashota Area

District of Thunder Bay

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By
S.E.Amuluru

1977

Ontario

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93-01337/

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Amukun, S.E.
1977: Geology of the Tashota Area, District of Thunder Bay; Ontario Geological Survey Report 167, 90p. Accompanied by Map 2354, scale 1 inch to ½ mile.

1000-300-77-H.R.

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Geological Map

(back pocket)

Map 2354 (coloured)–Tashota Area, District of Thunder Bay.

Scale 1:31,680 (1 inch to ½ mile).

ABSTRACT

The Tashota map-area encompasses an area of 260 km² (100 square miles) within the Wabigoon Subprovince of the Precambrian Shield in northwestern Ontario. The area includes the old Tashota gold camp which is located about 240 km (150 miles) northeast of Thunder Bay.

Figure 1–Key map showing location of Tashota Area. Scale 1 inch to 50 miles or 1:3,168,000.

The consolidated rocks form a complex, highly altered Early Precambrian (Archean) "greenstone" belt consisting of pillowed tholeiitic metabasalt flows (50 percent) that surround calc-alkaline metarhyodacitic to rhyolitic coarse pyroclastic rocks (15 percent) with associated iron formation and volcaniclastic rocks (5 percent). Rocks of andesitic and dacitic composition are rare. The metavolcanics and metasediments are intruded by dikes and sills of metagabbro, metadiorite, and lamprophyre that pre-date metamorphism, deformation, and emplacement of granitic intrusive rocks that represent several intrusive episodes, and underlie 30 to 35 percent of the map-area. The granitic rocks comprise a relatively older potassium-poor gneissic stock, the Elbow Lake Stock, and younger high level, potassium-rich stocks, the Gzowski Lake, and Robinson Lake Stocks. True granites (*sensu stricto*) are absent.

The metavolcanics and metasediments were subjected to upper greenschist-lower amphibolite facies conditions of regional metamorphism.

Foliation is well developed in the metavolcanic-metasedimentary assemblage, and in the Elbow Lake Stock, but is rare in the Robinson Lake Stock, Gzowski Lake Stock, and in the older metagabbroic sills and dikes. The northeast-trending axial plane traces of a major antiform-synform pair of folds have been interpreted around Knucklethumb, McDonough, Shed, and Metcalfe Lakes. Minor

folds are widespread. Two or possibly three separate lineation orientations plunge steeply in the plane of foliation, and bedding planes. Slaty cleavage is well developed in argillaceous metasedimentary beds. Faulting occurs throughout the area, but tends to be concentrated about the Gzowski Lake Stock.

Nearly all the exploration activity in the area has centred on mafic metavolcanics and auriferous quartz veins that also contain chalcopyrite, galena, silver-bearing minerals, and minor amounts of sphalerite, pyrite, and pyrrhotite. Recent endeavours have focused on the search for base metals and other precious metals. The gold-bearing quartz veins were formed in the mafic metavolcanics as late-tectonic, post-metamorphic injections into fractures, shears, and fault zones.

Geology of the Tashota Area District of Thunder Bay

by

S.E. Amukun[1]

INTRODUCTION

Access into the Tashota area was vastly improved following the completion of the National Transcontinental (Canadian National) Railway line through the area in 1913 (Hopkins 1916, 1917; Kindle 1931). Following a discovery of a spectacular gold showing by E.W. King-Dodds on August 21, 1915, at Howard Falls, about 43 km (27 miles) northeast of Tashota, prospectors rushed into the neighbouring country (Hopkins 1916, 1917; Gledhill 1925; Kindle 1931). This rush resulted in the discovery of numerous gold showings in and near the map-area. Tashota and the surrounding country soon became known as a gold camp when gold was first discovered by R. Wells on June 23, 1916 about 3.2 km (2 miles) southeast of Tashota Station (Hopkins 1917; Gledhill 1925; Kindle 1931). Several discoveries followed the Wells Discovery at Tashota including those of Messrs. Richardson, Devanney, Hull, Hendrickson, and Cline. A gold discovery was made later along Tashota Creek, south of the Tashota Station by George H. Adair in 1924 (Gledhill 1925). Because the number of claims staked (caused by the rush) increased, a mining division, called the Kowkash Mining Division, was formed in 1916. The town of Tashota became the home of the Mining Recorder (Hopkins 1917). Changing economic conditions and improvements in exploration technology have often encouraged renewed interest in gold, and, therefore a re-examination of these prospects. Within the last decade, numerous junior and senior mining companies have conducted exploration surveys in a search for copper, nickel, lead, and zinc, and the precious metals, gold, silver, and platinum. A considerable record of these and the old surveys is available in the assessment files at the Thunder Bay office of the Regional Geologist, Ontario Ministry of Natural Resources, and at the Assessment Files Research Office, Division of Mines, Toronto.

[1]Geologist, Division of Mines, Toronto. Manuscript accepted for publication by the Chief Geologist, February 12th, 1975.

Location

The centre of the map-area is located about 56 km (35 miles) north of the settlement of Jellicoe, and about 72 km (45 miles) northwest of the town of Geraldton. Tashota Station, now with only a few standing shacks, is situated northeast of Lake Nipigon, about 240 km (150 air miles), northeast of the city of Thunder Bay.

The map-area covers an area of approximately 260 km^2 (100 square miles), and is bounded by Latitudes 50°07′30″ and 50°15′00″N, and Longitudes 87°30′00″ and 87°45′00″W.

Access

Access to most of the area is restricted to small float-equipped aircraft that can be chartered from Jellicoe, Geraldton, Armstrong, or Nakina. The western part of the map-area, however, can be reached by rough logging roads that branch off from the road to Auden (an extension of Provincial Highway 801). The Canadian National Railway transcontinental line crosses the northern part of the area.

Within the area, numerous lakes including Elbow, Robinson, Gzowski, Oboshkegan, Metcalfe, Dyer, and Lac Ste. Marie Lakes provide easy access by canoe and motorboat. Most of the rivers and some small lakes are navigable with difficulty because of fallen logs, rapids, and shallow water.

Previous Geological Investigations

The Tashota map-area was not mapped in detail before 1973. Several reconnaissance surveys encompassing larger areas have, however, included investigation of certain parts of the area. In September 1915, Hopkins carried out a preliminary investigation of various gold discoveries in the Kowkash area. He spent the summer of 1916 making a topographical map as well as studying the geology of the area along water courses, railway and survey lines, and, with difficulty, in the bush. His reports, Hopkins (1916; 1917), describe the general geology of the area as well as the numerous gold properties that he visited.

As a result of additional discoveries of gold-silver veins in the early 1920s, Gledhill (1925) conducted a geological examination of the Tashota–Onaman Gold area in 1924. His survey took place along the Onaman River canoe routes and Onaman Lake, with a few land traverses being made from the rivers and lakes (Gledhill 1925, p.67).

The report includes a description of the gold discoveries in the Tashota gold camp.

Renewed interest in gold throughout the province about 1930 initiated a series of mapping projects by the Ontario Division of Mines (Davies 1973, p.2). The results of one of these was a report by Kindle (1931) accompanied by Map

No.40f, scale 1 inch to 2 miles (1:126,720) describing the Kowkash–Ogoki Gold area in which the Tashota area is included. This survey successfully outlined the approximate location of contacts between the main lithologic units and has been used extensively by prospectors and mining companies.

Moorhouse (1938), visited the Wascanna property located 1.5 miles (2.4 km) southeast of the town of Tashota in 1937, and described the geology around the property.

A generalized geology of the map-area is also available on a 1 inch to 4 mile (1:253,440) compilation map series by the Ontario Department of Mines (Pye *et al.* 1965); and preliminary maps for the adjoining area immediately to the south were completed in 1973 (Thurston 1973a,b). Aeromagnetic maps are also available at a scale of 1 inch to 1 mile (1:63,360) and 1 inch to 4 miles (1:253,440), GSC-ODM (1963a,b,c; 1962).

Present Geological Investigation

Fieldwork was conducted by the author and his assistants between May 30 and September 8, 1973. A preliminary map (P.931) at a scale of 1 inch to ¼ mile (1:15,840) was issued in 1974 (Anaukun 1974). The field map was prepared at a scale of 1 inch to ¼ mile (1:15,840), on cronaflex base maps prepared by the Cartography Section, Surveys and Mapping Branch, Division of Lands, Ontario Ministry of Natural Resources, from maps of the Forestry Resources Inventory, Division of Forests, Ontario Ministry of Natural Resources. The field data were plotted on acetate overlays on aerial photographs having the same scale as the base maps. Traverses were planned to cross the regional strike of the rocks at right angles, at suitable intervals, and, where possible, to be between distinct topographic features such as lakes, rivers, roads, railroads, trails, and surveyed lines. Attention was also given to lake shores, rivers, roads, and railroads. On the accompanying map (Map 2354, back pocket) some interpretation of outcrops, linear features, and extensions of diabase dikes that were not actually seen in the field was made by interpreting air photographs.

Acknowledgments

K.W. Treacher, the senior assistant was responsible for independent mapping of approximately half of the area. He also conducted most of the detailed mapping at a scale of 1 inch to 200 feet (1:2,400) of the 'Adair Prospect' (see section 'W.J.Cummer (4)') along grid lines cut by Derry, Michener, and Booth. Wherever possible, the author and Treacher ran adjacent traverses. Capable assistance was received from the following junior assistants: Paul Cooper, Ken Jewitt, and Wayne Liebau. The author is grateful for information provided by: Derry, Michener, and Booth; Noranda Exploration Company Limited; R. Noffke (Ottawa); Mildred U. Johnstone (Kirkland Lake); A.P. Hopkins (Toronto); William J. Cummer (Calgary); Dr. R. Oja (Thunder Bay); Frank Cuzzola (Welland); and Jan Zmudszinski (Jellicoe). Informative discussions with P.C. Thurston and W.O. Mackasey, colleagues of the author were particularly helpful. Fi-

nally, acknowledgments are due the residents of the settlement of Jellicoe, in particular the following: 1) Ontario Northern Airways, staff and management; and 2) the owners of the following: Jellicoe General Store, Collimar Lodge, Cedar Shores, and Travelair Lodge.

Prospecting and Mining Activity

Gold was first discovered in 1916 following an initial discovery about 43 km (27 miles) to the northeast at Howard Falls. The ensuing rush by prospectors led to the discovery of several other gold showings, some of which shipped test gold ore for instance the "Tash-Orn" in 1917, the "Adair" in 1931, and the "Wascanna" in 1936 and 1937. By the 1930s, the activity was restricted to encouraging properties such as the Adair Prospect, now of Cummer, W.J. (4)[1], and M.U. Johnstone and K.G. Cameron (8) properties, and Wascanna Prospect (18). Changing economic interest in gold has repeatedly encouraged a re-examination of these and other minor prospects, especially as new exploration techniques developed. Interest in iron deposits was initiated following the discovery of the Onaman Iron Ranges in 1904 (Moore 1909) which led to the establishment of numerous patented claims, especially those immediately to the east of the map-area. No sizeable deposit was apparently defined, and interest dwindled. From the 1960s up to the present, the area has been flown by airborne geophysical surveys and subjected to many follow-up ground programs in search for base metals and precious metals. During the 1973 field season, some of the old patented claims around Knucklethumb Lake were restaked by R. Middaugh. Blasting, trenching, and ground geophysical surveys were carried out by Derry, Michener, and Booth on the Adair and Knapp Prospects, see section on 'W.J.Cummer (4)' on behalf of New Fenimore Iron Mines Limited. Detailed exploration surveys including geological mapping and geophysical (electromagnetic and magnetic) surveys were being conducted by Noranda Exploration Company Limited on their ground.

Topography and Drainage

The physiographic development of the area mapped is similar to that of the surrounding regions. The area forms a part of the Onaman area which was described by Moore (1909, p.202 to 203).

With regard to the effect of the underlying rocks on the physiography, Moore (1909, p.204) wrote:

> The region has been so thoroughly peneplained that the rock formations have not exerted, on account of varying qualities of resistance, any great influence on the topography of the district as a whole. The greenstones may occur under swamps or in the highest hills...the rhyolites usually form hills, their white color on the weathered surface makes them unduly conspicuous, and one is liable to

[1]Number in parentheses refers to property number on Map 2354, back pocket.

overestimate their height when looking over the region. The Keweenawan diabases have eroded readily, and the dikes have been worn away as rapidly as the surrounding rocks. [Some of the dikes, however, were more resistant and form conspicuous ridges rising up to 150 feet (46.3 m) above the surrounding ground north of Hull Lake.]

The area is traversed by the watershed between the Great Lakes Basin and the Hudson Bay drainage area. This height of land averages 300 m (1,000 feet) above sea-level, attains an altitude of 340.8 m (1,118 feet) at Redmond (Moore 1909; Hopkins 1916, 1917), and is continuous through the map-area. The watershed is composed of morainic sand deposits and associated "kettle" lakes, with approximately 45.7 m (150 feet) of vertical relief between hills and valleys (Hopkins 1917; Kindle 1931). The watershed has been referred to as the Onaman Interlobate Moraine by Zoltai (1965, 1967). Either side of the divide, swamps with outdraining streams emerge in the watershed (Kindle 1931), and plains of sand and clay, which exceed 30 m (100 feet) in thickness occur at Tashota and in the area south of it. This drift topography is, in general, flat, so that hills of the same elevation are visible for many miles as described by Moore (1909, p.204):

> The drift is thick over parts of this area and since the forest fires have denuded it of trees, its topographic features stand out clearly. Its topography is in a youthful stage of development, as the ridges are sharp and many comparatively deep undrained depressions exist. Almost every phase of drift topography is found, from that of the ground moraine with almost level surface, now covered with swamps or muskegs and broken only by small knolls of drift, to the terminal (interlobate) moraines with deep undrained depressions and irregular hills. Some of these depressions contain lakes, while others are dry.

Eskers are prominent in the central part of the area, especially around Metcalfe Lake.

The drainage of the area is controlled by three streams and their distributaries; they are: Tashota Creek (north-central part of the area); Gzowski Creek (central part of the area); and North Onaman River (southeastern part of the area). These streams flow southwards, away from the height of land. Tashota Creek emerges from Tashota Lake and drains into McDonough Lake whose waters are connected to Elbow Lake via South Girvan Lake. Gzowski Creek flows from Gzowski Lake and follows a fault zone. Gzowski Creek also drains into McDonough Lake. The North Onaman River drains Lac Ste. Marie, Oboshkegan Lake, Barn Lake, and flows into Onaman Lake.

Natural Resources

The lakes and some large rivers contain large numbers of pike. Pickerel (Walleye), whitefish, and to a lesser extent trout, are also common. Good lakes for fishing are Elbow, Oboshkegan, Metcalfe, Dyer, and Gzowski Lakes. Elbow Lake is accessible via rough abandoned logging roads; Gzowski Lake is equipped with a fishing cabin, and is located within hiking distance of the old Redmond Station on the Canadian National Railway line. Oboshkegan, Metcalfe, and Dyer Lakes are accessible only by float-equipped bush aircraft.

Moose, deer and bear were seen by the field party. Beaver, skunk, squirrel, martin, otter, fisher, mink, muskrat, and weasel were reported in the area. Birds

in the area are partridge, grouse, ducks, loons, and geese.

Hopkins (1917, p.199) described the agricultural potential of the area as follows:

> Agriculture
>
> The area is not promising for agriculture, since it lies to the west of the great northern Ontario clay belt, and is largely occupied by compact rock, sand, gravel, swamp and some stratified clay. Small isolated tracts of clay loam suitable for farming occur along Johnson Creek, Ombabika River, Pawitik River and other parts of the area. In 1916, potatoes, beets, carrots, turnips, lettuce, onions and radishes were successfully grown by prospectors at mileage 60 on the railway and at the crossing of Johnson Creek and the railway. Also, during the same summer, attempts were made by squatters to cultivate the good clay loam along Johnson Creek which, in 1906, was denuded of trees by fires. Small trees have since come up, but these are easily cleared. Such land is excellent for farming purposes, but limited in extent.
>
> Among the small fruits blueberries are very plentiful on the sand plains and rocky knolls, wild strawberries are found on the clay flats, while wild red raspberries grow everywhere along the sides of the railway.

Paper companies logged timber in the western part of the map-area. There have been no permanent inhabitants in the area since the completion of such operations at the end of the 1960s. Auden (on the Canadian National Railway line) is the nearest settlement.

Water power was developed utilizing the water falls on the Robinson River at the peak of logging operations in the mid 1960s. Remains of the old dam are still preserved.

GENERAL GEOLOGY

The consolidated rocks of the Tashota area consist of complex, highly altered Early Precambrian (Archean) metavolcanics, volcaniclastic metasediments, iron formation, and associated coarse-grained mafic intrusions. This rock complex is a metavolcanic-metasedimentary assemblage forming part of the Wabigoon Belt (Goodwin 1970) in the Superior Province of the Precambrian Shield (see Compilation Map, Tashota–Geraldton Sheet, Map 2102, Pye *et al.* (1965)).

The metavolcanics underlie 65 percent of the map-area. These rocks are composed mostly of metabasalt flows (75 percent) that enclose metarhyodacitic to rhyolitic rocks which are predominantly composed of coarse pyroclastic rocks (25 percent). Andesitic to dacitic metavolcanics are rare.

Metasediments make up only 5 percent of the map-area. These rocks are associated with the felsic pyroclastic rocks, and are locally intercalated with them, suggesting that the metasediments are probably volcaniclastic in origin.

The metavolcanics and metasediments are intruded by dikes and sills of metagabbro, metadiorite, and lamprophyre that pre-dated emplacement of the granitic rocks.

Felsic intrusive rocks appear to have repeatedly invaded this part of the Wabigoon Belt. The oldest, most widespread stock, that around Elbow Lake, is a medium-grained, potassium-poor gneissose type, but the relatively younger, coarse-grained and massive bodies around Robinson and Gzowski Lakes are potassium-rich. Late magmatic events involved the intrusion of pegmatitic and

TABLE 1 | TABLE OF LITHOLOGIC UNITS FOR THE TASHOTA AREA.

PHANEROZOIC

CENOZOIC

QUATERNARY

RECENT

Organic deposits (peat bog); floodplain (alluvial) deposits

PLEISTOCENE

Glacial deposits, glaciofluvial deposits, glaciolacustrine deposits

UNCONFORMITY

PRECAMBRIAN

MIDDLE TO LATE PRECAMBRIAN

MAFIC INTRUSIVE ROCKS

Fine-grained and medium-to coarse-grained ophitic diabase dikes, porphyritic diabase

INTRUSIVE CONTACT

EARLY PRECAMBRIAN (ARCHEAN)

FELSIC IGNEOUS AND METAMORPHIC ROCKS

FELSIC INTRUSIVE ROCKS

Pegmatite, aplite, felsite, quartz and/or feldspar porphyry, alaskite, micropegmatite

INTRUSIVE CONTACT

Quartz diorite, monzonite, hornblende-biotite-quartz monzonite[1], hornblende-quartz monzonite[2], hornblende-biotite-quartz monzonite, biotite-quartz monzonite, quartz-feldspar porphyry

INTRUSIVE OR GRADATIONAL CONTACT

METAMORPHOSED FELSIC INTRUSIVE AND MIGMATITIC ROCKS

Hornblende-biotite trondhjemite, hornblende-biotite granodiorite gneiss, hornblende-biotite-quartz monzonite gneiss, porphyritic biotite gneiss, amphibolite, migmatite[3], quartz diorite

INTRUSIVE CONTACT

MAFIC INTRUSIVE ROCKS

Metagabbro, hornblende metagabbro, porphyritic mafic intrusive rocks, metadiorite, hornblende lamprophyre

INTRUSIVE CONTACT

METAVOLCANICS AND METASEDIMENTS

METASEDIMENTS

Argillite (phyllite), slate, conglomerate, arkose, greywacke, chert, sandstone

FELSIC METAVOLCANICS

Rhyolite to rhyodacite, rhyolite porphyry, tuff, lapilli-tuff, tuff-breccia, pyroclastic breccia, schist

MAFIC METAVOLCANICS

Mafic flows, tuff, breccia, agglomerate, recrystallized flows, schist

IRON FORMATION

1. Robinson Lake Stock
2. Gzowski Lake Stock
3. Elbow Lake Stock

aplitic dikes, veins, and pods. Later diabase dikes post-date the granitic rocks. These dikes fill fault or fracture zones and form high ridges.

Pleistocene and Recent deposits cover most of the map-area. The Recent deposits consist of organic and alluvial material. Pleistocene deposits include glacial, glaciofluvial, and glaciolacustrine material deposited by the retreating and melting glaciers of glacial Lake Agassiz (Zoltai 1965, 1967). Remnants of Lake Agassiz deposits also occur in the area.

Precambrian

EARLY PRECAMBRIAN (ARCHEAN)

Metavolcanics and Metasediments

MAFIC METAVOLCANICS

The mafic metavolcanics have been highly altered by cataclasis and metamorphism, but some primary structural features are still preserved. These lavas are predominantly tholeiitic basalts with rare andesites (see section on "Petrochemistry") and consist dominantly of well-developed, but stretched pillow lavas (Photo 1). Flows with porphyritic phases are best exposed near the southern shore of Wells Lake. The feldspar phenocrysts of these rocks are partially saussuritized, sericitized, and zoisitized, and range in size from 0.6 cm (¼ inch) to 2.5 cm (1 inch) in diameter. Other primary structures include amygdules and vesicles. Several zones of massive, coarse-grained rocks are distinguishable within the massive, pillowed, and porphyritic flows. Because of the lack of isotopic data and field evidence, it is unknown whether these zones represent mafic intrusive rocks, recrystallized sections of the flows that surround them, or whether they are centres of thick flows.

Photo 1–Moderately stretched pillow structures in mafic lavas, northwest of Sceptre Lake.

Three rock types have been produced by the alteration of the mafic metavolcanics, these are: 1) foliated chlorite schists, 2) massive, fine- to medium-grained amphibolite and hornblende schist, 3) foliated and banded, fine- to medium-grained quartz-feldspar-amphibole schist and gneiss (migmatite). Migmatites are widespread adjacent to the margins of the trondhjemite-granodiorite gneiss around Elbow and South Girvan Lakes. Approximately 50 percent of the map-area is underlain by metabasalt flows and derived schists. Mafic tuff is restricted to contacts with the more felsic metavolcanics.

Less altered flows consist of green to blue-green amphibole + albite ± minor epidote, quartz, calcite, opaque minerals, chlorite and ± trace amounts of sericite, clinozoisite (saussurite), biotite, apatite, and sphene. Highly altered schists differ from the less altered flows as follows: 1) amounts of hornblende, chlorite, carbonate, sericite, and clinozoisite (saussurite) are greater, 2) hornblende may constitute up to 90 percent of the rock in amphibolite, and 3) amounts of quartz and hornblende in the quartz-feldspar-amphibolite schists and gneisses (migmatites) are greater. Chemical and partial chemical analyses of mafic metavolcanics are given in Tables 2a and 2b; the field location is shown in Figure 2. The texture varies with the degree of alteration from well-preserved ophitic and diabasic textures in relatively fresh rocks to granoblastic in the derived schists.

The mineral assemblage of the mafic metavolcanics is indicative of upper greenschist-lower amphibolite facies and is typical of much of the mafic volcanic rocks of the Wabigoon Belt.

TABLE 2A CHEMICAL ANALYSES OF MAFIC METAVOLCANICS FROM THE TASHOTA AREA. CHEMICAL ANALYSES BY MINERAL RESEARCH BRANCH, ONTARIO DIVISION OF MINES.

CHEMICAL ANALYSES, MAJOR COMPONENTS IN PERCENT

Sample Number	A111-1	A368-1	A372-1	A2126	A2196
Rock Type	Tholeiitic Basalt	Tholeiitic Basalt	Tholeiitic Basalt	High Alumina Basalt	Tholeiitic Basalt
SiO_2	49.40	50.50	48.40	45.20	48.70
Al_2O_3	13.90	14.30	15.50	14.20	15.90
Fe_2O_3	3.22	1.76	2.22	0.96	1.17
FeO	9.34	8.85	8.53	8.76	10.10
MgO	6.40	6.40	8.50	7.18	3.07
CaO	11.20	10.70	11.30	9.21	9.44
Na_2O	2.35	1.46	1.84	1.65	2.78
K_2O	0.43	0.14	0.17	0.07	0.07
H_2O^+	0.67	2.04	2.02	4.54	3.14
H_2O^-	0.13	0.11	0.10	0.42	0.13
CO_2	0.18	1.60	0.12	5.80	4.92
TiO_2	1.10	0.78	0.86	0.86	0.93
P_2O_5	0.09	0.05	0.05	0.07	0.06
S	0.04	0.04	0.02	0.04	0.04
MnO	0.24	0.20	0.21	0.19	0.38
Total	98.70	98.90	99.80	99.20	100.80
S.G.	3.07	2.98	3.03	2.82	2.76

Abbreviation
S.G. Specific Gravity

TABLE 2B PARTIAL CHEMICAL ANALYSES OF MAFIC METAVOLCANICS FROM THE TASHOTA AREA. CHEMICAL ANALYSES BY MINERAL RESEARCH BRANCH, ONTARIO DIVISION OF MINES.

CHEMICAL ANALYSES, MAJOR COMPONENTS IN PERCENT

Sample Number	A36-1	A82	A271-2	A396	A2059	A2126	A2198	A2208
SiO_2	48.00	53.80	50.80	53.30	51.40	48.00	53.80	55.90
Al_2O_3	16.60	14.00	17.70	13.80	15.00	15.50	15.90	16.10
Total Fe as Fe_2O_3	13.00	11.90	9.13	13.60	13.30	11.90	12.50	10.80
MgO	7.17	6.97	7.36	5.31	5.70	5.65	3.34	4.22
CaO	10.50	10.00	12.90	11.90	8.90	8.99	10.90	7.40
Na_2O	2.43	2.94	1.43	1.78	1.19	2.78	2.02	3.34
K_2O	0.48	0.31	0.19	0.19	0.07	0.14	0.24	0.17
MnO	0.22	0.22	0.01	0.26	0.19	0.19	0.32	0.21
TiO_2	0.90	1.17	0.40	1.12	0.86	0.98	0.81	1.36

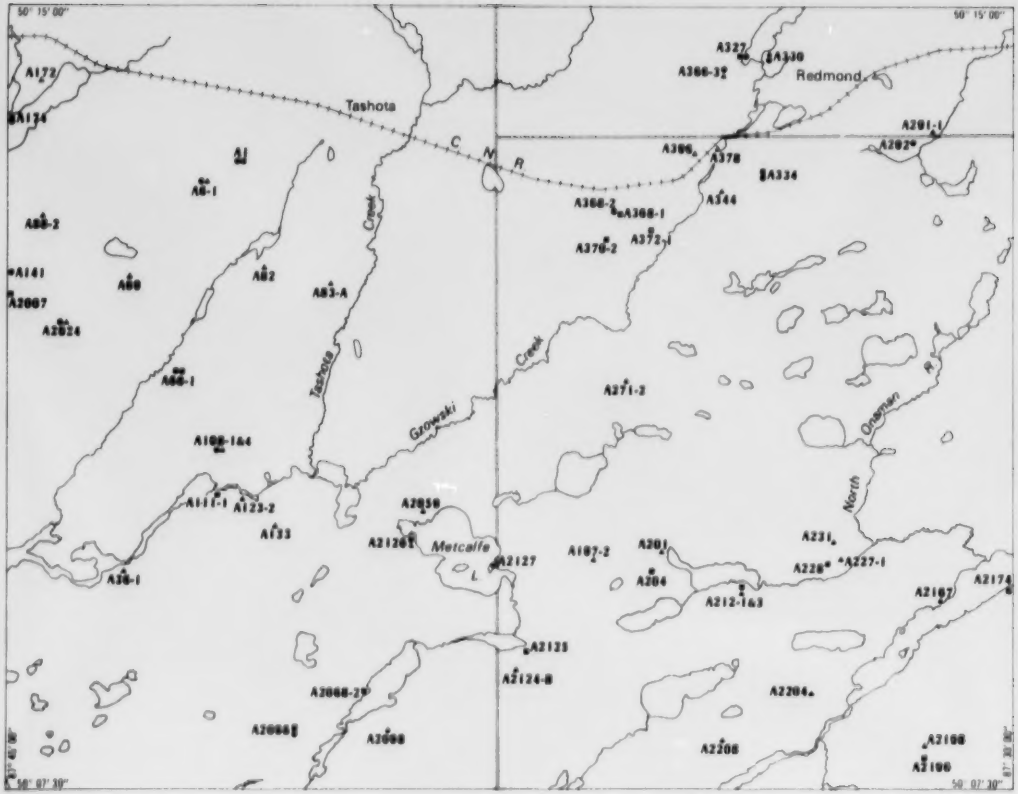

Figure 2–Location of samples analysed from the Tashota Area.

FELSIC METAVOLCANICS

Like the mafic metavolcanics, the felsic metavolcanics have also been highly altered and deformed by metamorphism, but primary fragmental structures are still preserved. The rocks are predominantly calc-alkaline rhyolite to rhyodacite pyroclastic units with minor amounts of dacite, and are composed of lenticular felsic fragments as much as 76.2 to 91.4 cm (2½ to 3 feet) long in a siliceous and chloritic matrix.

The original size and angularity of the fragments is difficult to estimate because of the intense stretching to which they have been subjected. These fragmental units are not continuous, being distributed locally and randomly throughout the felsic belts and as layers 0.9 to 3.0 m (3 to 10 feet) thick.

Two major isolated felsic metavolcanic units comprise 25 percent of the metavolcanics or 15 percent of the map-area. The Metcalfe–Oboshkegan Lakes Unit attains an average strike length of 12 000 m (40,000 feet) and a width of 2400 m (8,000 feet). That centred around Lac Ste. Marie is 3000 m wide and 4800 m long (10,000 feet by 16,000 feet) within the map-area. In each of these lithological units, there is a proportional size increase of the fragments to the northeast. Thus, the rocks around Metcalfe-Dyer Lakes in the south-central part of the map-area are formed of lapilli-tuff (Photo 2), (Fisher 1966), but north of Knucklethumb Lake in the central part of the map-area, the rocks are pyroclastic breccias (Fisher 1966), (see Photo 3). Similarly, the tuff-breccia around Oboshkegan Lake (east of the map-area) is on strike with the coarse felsic pyroclastic rocks observed by the author east of the map-area around Castor Lake (Photo 4). The Lac Ste. Marie Unit contains a quartz and/or feldspar porphyry phase and local intercalations of ferruginous metasediments. Although the original texture is largely obliterated, the fragments here also seem to increase slightly in size towards the northeast.

In all the volcanic breccias (Parsons 1969), the fragments or tephra (Thorarinson 1954) are poorly sorted in size in each class, the assigned name being derived from the combined percentage of each end-member size (Fisher 1966, p.292). The fragments vary from lenticular, subrounded (in the larger sizes), to subangular (in the smaller sizes) and lithic angular in the smallest microscopic sizes. Because the tephra are poorly sorted, and become progressively larger in size toward one direction, they are thought to represent either:

1) Solid fragmental material ejected into the air during eruption that fell without sorting by the wind, the coarser clasts or bombs being accumulated closer to the eruptive fissure. This represents the Vulcanian type of pyroclastic breccia described by Parsons (1969, p.268), or:

2) A vent or fissure complex of agglomerate and breccia i.e. vent agglomerates and vent breccias within pyroclastic breccia clasts.

The original size and angularity of the fragments can only be estimated with difficulty, because of the intense stretching to which they have been subjected. The pyroclastic rocks are cut by a variety of dikes and lenses of intrusive and/or extrusive quartz and quartz-feldspar porphyry (compare Parsons 1969, p.287).

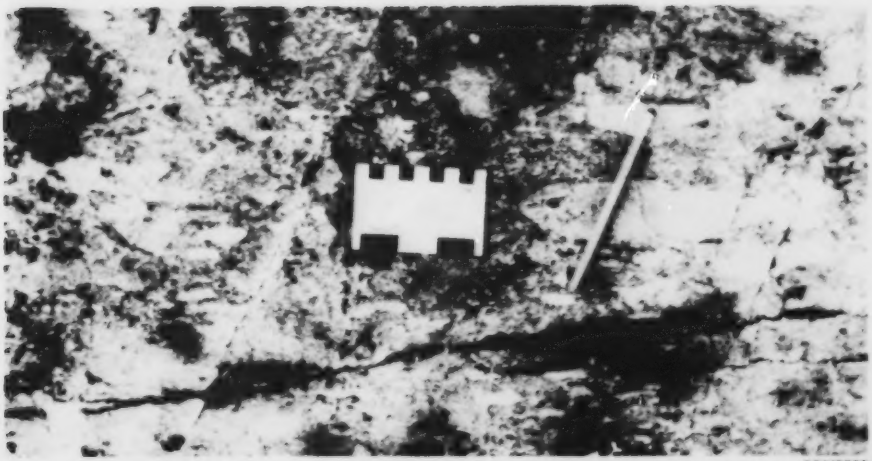

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Photo 2–Lapilli-tuff outcrop, western shore of Dyer Lake.

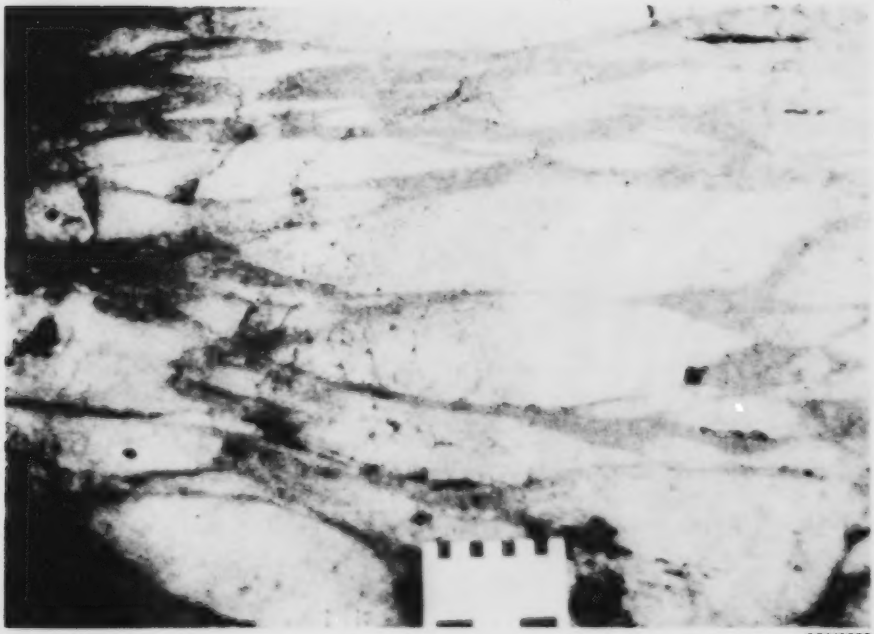

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Photo 3–Pyroclastic breccia outcrop, north of Knucklethumb Lake.

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Photo 4–Pyroclastic breccia outcrop, Castor Creek, east of Castor Lake (photo by John Scott).

Large rounded quartz "eyes" of lapilli size (2 to 64 mm), (Photo 5), are probably primary, and are widespread within the felsic pyroclastic rocks. These quartz "eyes" are probably large phenocrysts, but could be metamorphic in origin.

Two rock types have been produced by the alteration of the felsic pyroclastic rocks, they are: 1) sericite ± carbonate ± talc schist, produced by dynamic metamorphism and 2) chlorite ± hornblende ± carbonate ± sericite schist, produced by contact and regional metamorphism.

Petrographic study of the pyroclastic rocks reveals that these rocks are highly altered; the feldspars are altered to sericite, saussurite, and carbonate; and the ferromagnesian minerals are altered to secondary amphibole + chlorite. The pyroclastic rocks are subangular to subrounded, heterolithologic, and show a wide range in size from ash (<2 mm) to lapilli (2 to 64 mm) to blocks and bombs (>64 mm), (Fisher 1966, p.292). The matrix is composed of ash-sized grains of calcite, chlorite, sericite, feldspars, and quartz, but individual larger particles are angular, heterolithologic (Photo 6), and can be either lithic or crystalline. Chemical and partial chemical analyses of representative felsic coarse fragmental rocks are presented in Tables 3a and 3b; the field location of the samples is shown in Figure 2.

The quartz + plagioclase + chlorite ± epidote ± hornblende mineral assemblage is indicative of lower to upper greenschist facies metamorphic rank.

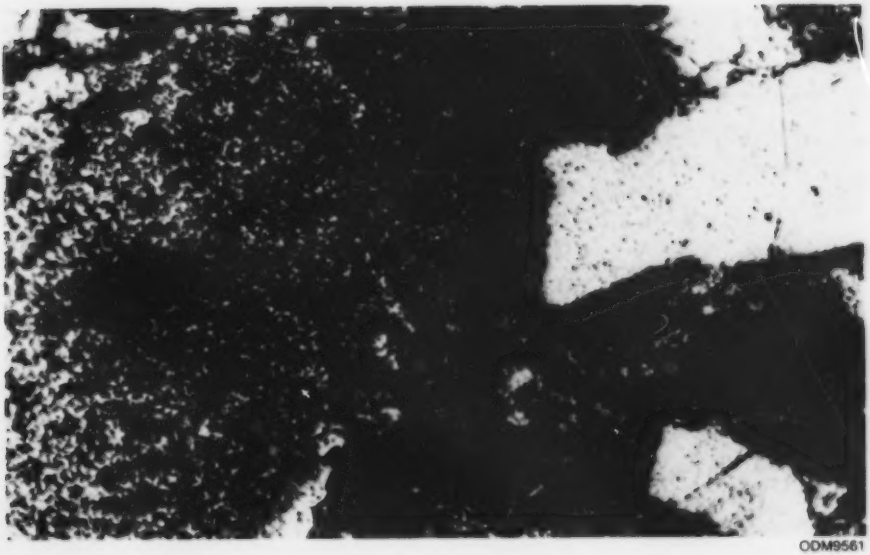

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Photo 5–Photomicrograph of quartz grains "eyes" (white) and lithic fragment (left centre) from rhyodacite outcrop, Metcalfe Lake, in pyroclastic breccia (crossed nicols).

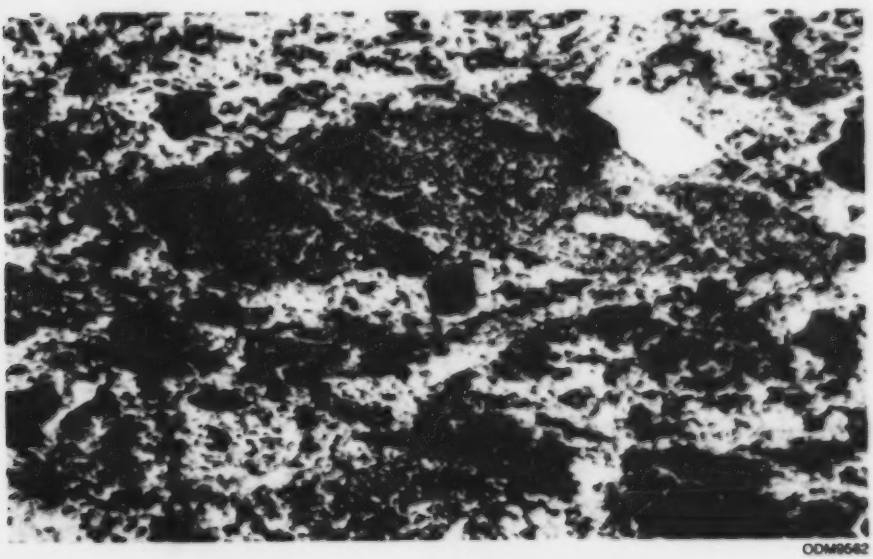

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Photo 6–Photomicrograph of angular, heterolithologic fragments of felsic lapilli-tuff, Oboshkegan Lake area (Plane Polarised Light, 10X Magnification).

TABLE 3A CHEMICAL ANALYSES OF FELSIC METAVOLCANICS IN THE TASHOTA AREA. CHEMICAL ANALYSES BY MINERAL RESEARCH BRANCH, ONTARIO DIVISION OF MINES.

CHEMICAL ANALYSES, MAJOR COMPONENTS IN PERCENT

Sample Number	A204	A2068Z	A2125	A2127	A2174
	Calc-alkaline Rhyolite	Calc-alkaline Rhyodacite	Calc-alkaline Rhyodacite	Calc-alkaline Rhyolite	Calc-alkaline Rhyodacite
SiO_2	71.80	66.90	68.10	71.20	68.30
Al_2O_3	16.00	16.30	14.40	15.40	14.00
Fe_2O_3	1.12	0.98	1.50	0.28	2.09
FeO	1.30	2.60	2.03	0.49	1.62
MgO	0.78	1.29	0.89	0.25	1.42
CaO	1.38	0.92	2.17	2.63	2.68
Na_2O	4.16	5.65	3.05	4.51	3.78
K_2O	2.56	2.07	3.47	1.64	0.70
H_2O^+	0.84	1.41	1.10	0.61	1.34
H_2O^-	0.11	0.20	0.13	0.13	0.13
CO_2	0.26	0.15	1.76	1.34	0.88
TiO_2	0.30	0.33	0.45	0.34	0.32
P_2O_5	0.07	0.10	0.12	0.07	0.11
S	0.07	0.01	0.01	0.01	1.83
MnO	0.03	0.08	0.05	0.01	0.07
Total	100.80	99.00	99.20	98.90	99.30
S.G.	2.70	2.68	2.69	2.69	2.73

Abbreviation
S.G. Specific Gravity

TABLE 3B PARTIAL CHEMICAL ANALYSES OF FELSIC METAVOLCANICS IN THE TASHOTA AREA. CHEMICAL ANALYSES BY MINERAL RESEARCH BRANCH, ONTARIO DIVISION OF MINES.

CHEMICAL ANALYSES, MAJOR COMPONENTS IN PERCENT

Sample Number	A201	A231	A344-2	A83A	A197-2	A2124B	A2167	A2204
SiO_2	68.00	67.00	67.60	65.60	73.30	67.50	64.80	66.20
Al_2O_3	13.70	16.10	15.70	13.80	8.13	13.90	14.90	15.60
Total Fe as Fe_2O_3	3.72	3.72	2.30	4.54	5.88	5.51	4.15	5.21
MgO	0.93	0.93	1.39	2.25	0.23	1.22	1.53	1.50
CaO	3.50	2.20	2.90	3.00	0.51	3.51	3.24	4.40
Na_2O	2.81	3.13	3.88	4.96	0.51	3.31	2.30	4.24
K_2O	2.24	2.77	2.48	1.30	1.76	1.62	2.41	0.63
TiO_2	0.37	0.38	0.21	0.49	0.16	0.37	0.33	0.47
MnO	0.07	0.07	0.06	0.09	0.01	0.09	0.07	0.10

METASEDIMENTS

Metasediments form only 5 percent of the map-area, outcrop adjacent to Knucklethumb and Crescent Lakes, and are associated with felsic pyroclastic rocks in which they are locally intercalated. The felsic pyroclastic rocks are conformably overlain by the metasediments (Amukun 1974) and appear to grade upwards into the metasediments (Hopkins 1917, p.204). Thin beds of greywacke, argillite, and slate predominate, but conglomerate, sandstone, chert, and ferruginous carbonates occur locally. Any outcrop of metasediments may consist of one or more of the above mentioned units.

The slates are light to dark grey on weathered surfaces, medium grey to dark black on fresh surfaces, and possess a perfect slaty cleavage. The beds generally consist of thin, dark, fine- and medium- to coarse-grained layers 2.5 to 7.6 cm (1 to 3 inches) thick, but a few fine beds of metagreywacke are interlayered with the slates. Other sedimentary structures observed include crossbedding and poorly developed graded bedding. The rocks are predominantly slates but vary from argillite to phyllite to schist.

Greywacke is dark to brownish grey on weathered surfaces. Greywacke beds are generally massive and exceed 10 cm (4 inches) in thickness and contain small particles of quartz and feldspar.

Thin beds of sandstone and chert are exposed about 300 m (1,000 feet) south of Knucklethumb Lake where they are interlayered with thin layers of siltstone, and slate (Photo 7).

Only a few outcrops of conglomerate were observed, and these exposures were also located about 300 m (1,000 feet) south of Knucklethumb Lake. The pebble-size clasts are predominantly volcanic and are sparsely distributed. Boudin structure, irregular bedding, and rapid lithologic changes were observed.

The metasediments are composed of clastic fragments of quartz and plagioclase in a chloritic and sericitic matrix. Matrix minerals include calcite + quartz + albite + magnetite + hematite + pyrite + kaolin (?) + epidote ± garnet.

Structural and geophysical data suggest that the metasediments adjacent to Knucklethumb Lake occur near the axis of a synform, which is located just south of the lake (see Figure 9).

The iron formation around Crescent Lake is associated with chert, slate, graphitic argillite, phyllite, greywacke, and schist which contain pyrite, pyrrhotite, magnetite, chert, and jasper and were intersected by diamond drilling by Candela Development Company Limited (Assessment Files Research Office, Ontario Division of Mines, Toronto). At Lac Ste. Marie, (magnetite) iron formation associated with narrow sedimentary units has been reported by Kindle (1931, p.77). This particular outcrop was not located by the author and his assistants.

The metasediments were considered to be part of a felsic pyroclastic-volcaniclastic (metasedimentary) assemblage by Kindle (1931, p.75), Hopkins (1917, p.204), and Pye *et al.* (1965) probably because these rocks are associated with, and interlayered with indisputable pyroclastic rocks. The sedimentary rocks consist of weathered products of all types of the volcanic rocks in the area. The fragments in the metasediments are rounded, the rocks are better stratified and sorted than the pyroclastic rocks, and they exhibit normal sedimentary structures such as crossbedding and graded bedding. Because the metasediments are

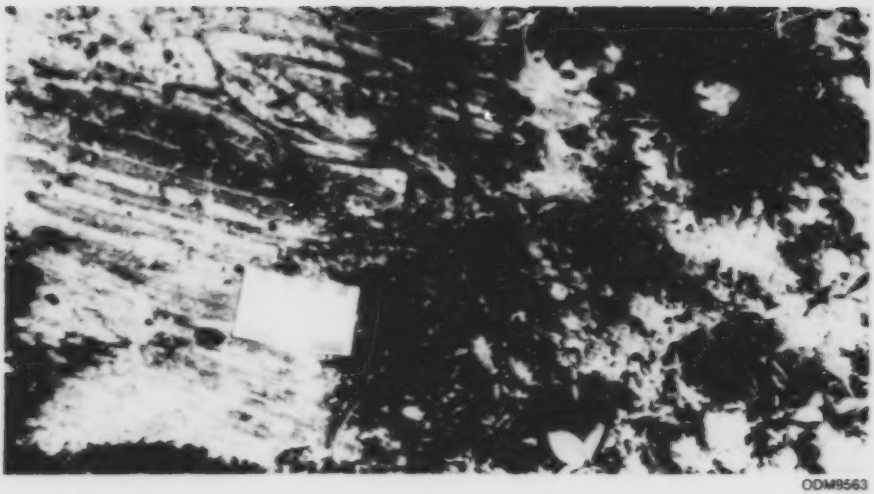

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Photo 7–Thin bands of arkosic quartzite (light) with interbeds of slate, chert and phyllite (dark), east of Knucklethumb Lake.

intimately associated with the pyroclastic rocks, they could be compared to various other similar rocks, such as the mixed rocks of Williams *et al.* (1954), or the epiclastic volcanic rocks of Fisher (1960, 1961), or finally, the sedimentary (non-volcanic) rocks of Wright and Bowes (1963). Chemical and partial chemical analyses of metasediments are given in Table 4; the field location is shown in Figure 2.

IRON FORMATION

Iron formation occurs interbedded with the mafic metavolcanics around Tashota and McDonough Lakes, and is interbedded with the felsic metavolcanics around Hull and Crescent Lakes. Ground and airborne magnetometer data, as well as diamond-drill records have been utilized to outline the iron formation shown in Figure 9 around Tashota–McDonough Lakes, Hull and Crescent Lakes. Magnetite forms a great part of the unit, but pyrrhotite, pyrite, and hematite have been reported in the files of the Assessment Files Research Office, Ontario Division of Mines, Toronto. Moore (1909) also described occurrences of jasper in iron formation. Siliceous ferruginous carbonates in association with iron formation were also reported by Hopkins (1917, p.203) and Kindle (1931, p.67) from the Tashota gravel pit (dolomite) and Wells Claim (ankerite) now the Wascanna Prospect (18). The author and his assistants were unable to locate these exposures.

TABLE 4 | CHEMICAL AND PARTIAL CHEMICAL ANALYSES OF METASEDIMENTS IN THE TASHOTA AREA. CHEMICAL ANALYSES BY MINERAL RESEARCH BRANCH, ONTARIO DIVISION OF MINES.

CHEMICAL ANALYSES, MAJOR COMPONENT IN PERCENT

Sample Number	A212-1	A212-3	A228		A227-1	A2098
SiO_2	71.70	73.70	65.00		64.20	61.80
Al_2O_3	12.70	13.40	17.10		13.20	15.50
Fe_2O_3	0.44	0.37	1.19	Total Fe as Fe_2O_3	6.68	10.10
FeO	4.30	1.46	3.73		ND	ND
MgO	1.53	0.36	1.80		1.82	2.76
CaO	3.19	3.02	1.31		2.31	3.75
Na_2O	2.54	3.51	2.86		2.37	2.43
K_2O	1.37	1.86	2.44		2.05	2.10
H_2O^+	0.88	0.69	2.23		ND	ND
H_2O^-	0.00	0.08	0.17		ND	ND
CO_2	0.24	1.85	0.23		ND	ND
TiO_2	0.42	0.36	0.46		0.41	0.66
P_2O_5	0.11	0.08	0.06		ND	ND
S	0.29	0.15	0.21		ND	ND
MnO	0.06	0.07	0.07		0.07	0.34
Total	99.80	101.00	98.90			
S.G.	2.74	2.67	2.74			

Notes
Sample A212-1, Argillite
A212-3, Arkosic quartzite
A228, Slate
Abbreviations
S.G. Specific Gravity
ND Not determined

Iron formation is also indicated by aeromagnetic surveys and diamond-drill data to occur about Lac Ste. Marie and Knucklethumb Lakes. Banded magnetite iron formation has been reported by Kindle (1931, p.77) to have been replaced by pyrite which carries low gold values. This outcrop was not located by the author or his assistants. This zone forms the western limit of the Onaman Iron Range which was described by Moore (1909, p.232-233) as follows:

STRATIGRAPHIC AND STRUCTURAL RELATIONS

The Iron formation lies conformably everywhere upon the pyroclastic and sedimentary series previously described. Where these rocks are absent, it may come in contact with rhyolite or green schist, but it has not been observed in contact with typical greenstone, except where the two formations were brought together by faulting. The jasper is separated from the green schist and, as a rule, from the rhyolite, by a slate, usually a phyllite. There seems to be good evidence, as already pointed out in the consideration of the acid eruptives, that the Iron formation has been intruded and to some extent overflowed by the rhyolite-porphyry and rhyolite mass lying across the east end of the northern range. Outside of this one case, there is no definite evidence to show that these rocks have intruded this formation, and there is a good deal of evidence to show that most of them are older than the Iron formation. They are folded into it in several places, and, as already mentioned, the presence of a zone of sediments around the outcrop distinguishes these masses from those which were intruded...

Petrography of the Iron Formation

There are several distinct rocks included in the Iron formation, but they are so related that they must be treated as a unit. These rocks are ferruginous cherts, slates, phyllites, graywackes, actinolite-magnetite-schists, dumortierite-magnetite slates and jaspers, garnetiferous and tourmaline slates. The last four of these types have been treated pretty fully in the sections on Dynamo-Regional and Contact Metamorphism and will not be discussed in detail here.

The relations between the rocks of this formation are such that a band of jasper half an inch in width [1.3 cm] may occur between bands of slate and graywacke 20 feet [6 m] in width, and, on the other hand, almost clear jasper bands may reach a maximum of nearly 50 feet [15 m]. Some of the narrow bands of ferruginous cherts may contain a large percentage of iron, as, for example, one band a few inches wide from the southern range, which was analysed and found to contain 50 percent of metallic iron and 23 percent of silica.

The banding in the jaspilites, which consist of banded jasper, red or black, alternating with bands of cherty quartz, is often distinctly marked, but the bands are not so clear cut as in the Iron formations of some other regions.

MAFIC INTRUSIVE ROCKS

Mafic intrusive sills and dikes of massive, medium- to coarse-grained and foliated metagabbro, metadiorite, and lamprophyre intrude the metavolcanics and metasediments. The intrusion of these rocks pre-dated regional metamorphism, deformation, and granitic emplacement because of the following:

1) The metamorphic mineralogy is similar to that of the surrounding metavolcanics and metasediments.
2) Gabbroic-dioritic xenoliths are found in the felsic intrusive rocks.
3) Deformation features, such as foliation and schistosity in the mafic intrusive rocks have the same orientation as the country rocks. A few of the rocks in this class, especially those south of Oboshkegan Lake, north of Barn Lake and around Dyer Lake could possibly be interpreted as massive flows having gabbroic texture within the flow lavas, and do not have an intrusive origin.

The metagabbro weathers white-grey, but is pale green to grey on fresh surfaces. The texture ranges from equigranular, massive, coarse grained, to schistose, medium to fine grained, with occasional porphyritic zones. In thin sections, metagabbro has subophitic to ophitic texture, and consists of hornblende (40 to 60 percent) epidote, chlorite, plagioclase (25 to 50 percent), relict clinopyroxene ± quartz (trace) ± biotite ± magnetite and opaque minerals. Metagabbro is basaltic in composition, (see Section on "Petrochemistry") and has undergone the same degree of metamorphism as the metavolcanics. Some of the metagabbro is composed of over 50 percent amphibole and is dark green, fairly well foliated and displays a granoblastic texture which is sometimes obliterated by shearing or contact metamorphism.

A few outcrops of diorite were mapped in the field, but the composition of these rocks was not verified by chemical or petrographic studies. The diorites grade into, and are associated with metagabbroic rocks.

Photo 8–Photomicrograph of subrounded crystalline fragment-like mass suspended in fine-grained groundmass, Oboshkegan Lake lamprophyre (Plane polarised light, 10X Magnification).

As reported previously (Kindle 1931, p.79) a 60 cm (2-foot) wide lamprophyre dike cuts the felsic pyroclastic rocks at the cabin half way along the western shore of Oboshkegan Lake. This rock is distinctive in outcrop because it is irregular in shape and weathers very rapidly so that on weathered surfaces the dike displays rough, rugged, sharp ridges. These ridges are composed of medium- to fine-grained grey to black pseudomorphed pyroxene (?) phenocrysts. The dike has a granulated, salt-and-pepper texture, and has a dioritic or gabbroic composition. Microscopic study reveals that this rock is quite altered, being made up of over 50 percent calcite and chlorite. Other minerals include chiefly plagioclase (andesine) (?) + hornblende + pyroxene pseudomorphs (augite) (?) plus minor amounts of biotite, quartz, and apatite, and opaque minerals. The dark minerals occur both as phenocrysts and in the groundmass. This corresponds to the spessartite class of lamprophyre of Williams *et al.* (1955). A peculiar textural feature of the groundmass is the presence of subrounded to subangular lithic-like fragments suspended in the groundmass (Photo 8). These fragments can be interpreted as relict ferromagnesian crystals, volcanic fragments or altered garnet. Partial chemical analysis are given in Table 5, the field location is shown in Figure 2. Kindle (1931, p.79) also reported another similar dike on the northwestern shore of Lac Ste. Marie. This dike was not found by the author or his assistants.

TABLE 5 | PARTIAL CHEMICAL ANALYSES OF MAFIC INTRUSIVE ROCKS IN THE TASHOTA AREA. CHEMICAL ANALYSES BY MINERAL RESEARCH BRANCH, ONTARIO DIVISION OF MINES.

CHEMICAL ANALYSES, MAJOR COMPONENTS IN PERCENT

Sample Number	A378
SiO_2	53.20
Al_2O_3	15.80
Fe_2O_3	12.60
FeO	
MgO	4.36
CaO	7.82
Na_2C	3.08
K_2O	0.48
MnO	0.22
TiO_2	1.31

Felsic, Igneous, and Metamorphic Rocks

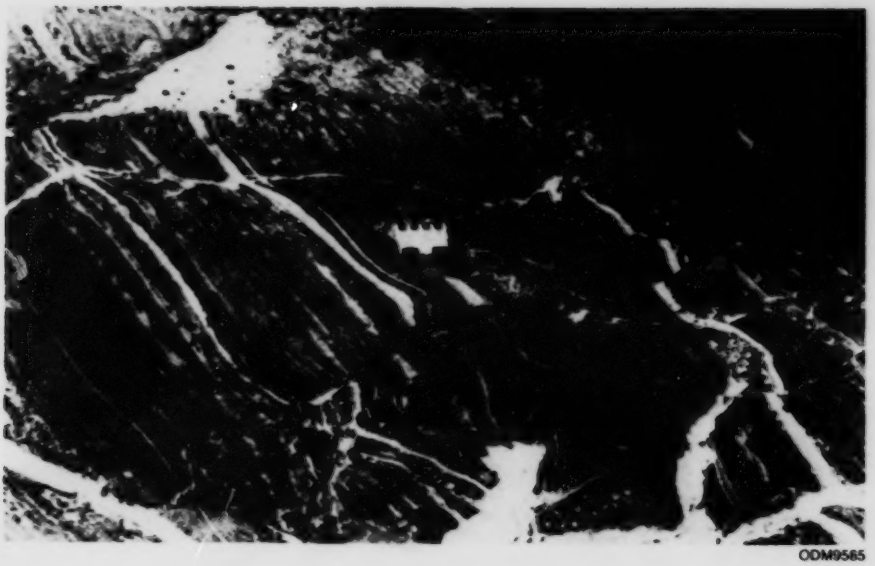
Early Precambrian granitic rocks underlie 30 to 35 percent of the area, and comprise a series of three distinct intrusive stocks, each of which may represent a discrete emplacement of magma. The composition and texture of the rocks within each pluton are relatively constant, whereas the composition and texture vary from pluton to pluton. Pluton margins are also modified by migmatization, assimilation, and contact metamorphism. The classification of granitic rocks used in this report, and in reports of the Ontario Division of Mines, is described by Ayres (1972).

The three distinct stocks of the Tashota area are isolated and are located around three large lakes, namely Elbow, Gzowski, and Robinson Lakes. For simplicity of description, the stocks will be referred to in this report, in order of inferred decreasing age of emplacement as the Elbow Lake, Gzowski Lake, and Robinson Lake Stocks.

METAMORPHOSED FELSIC INTRUSIVE AND MIGMATITIC ROCKS

Elbow Lake Stock

The Elbow Lake Stock is inferred to be the oldest of the stocks for reasons that will be discussed below. It is the largest stock and is made up of medium-grained, moderate to well foliated, equigranular, biotite-rich gneissic and migma-



ODM9565

Photo 9–Thinly layered migmatite, Elbow Lake Stock.

titic (minor amounts of agmatite) rocks of quartz monzonite, trondhjemite and granodiorite composition. The gneissic rocks are composed of oligoclase, hornblende, and quartz, with variable amounts of potassic feldspar, biotite, chlorite, sphene, and iron sulphide minerals. Near the margins between the gneissic granitic rocks and mafic metavolcanics, the foliation becomes progressively more pronounced. The margins eventually change into a narrow banded zone formed of migmatite close to the mafic metavolcanics. The composition and structure of the migmatite is highly variable. The most common structure is that of banded dark coloured migmatitic gneiss made up of narrow 2.5 to 25.4 cm (1 to 20 inch) thick alternating amphibolite and granitic layers (Photo 9). Gneissosity lineation, and minor isoclinal folds, are well developed. The least common structure developed is that consisting of medium to large angular coarse-grained amphibolite xenoliths in a quartzo-feldspathic granitic groundmass, most commonly referred to as agmatite (Photos 10 and 11). The migmatitic rocks are restricted to felsic intrusive metavolcanic rock contacts and represent inter-reaction and assimilation products between the granitic rocks and older metavolcanics. Granitic, aplitic, and pegmatitic dikes are abundant in the Elbow Lake Stock, and these bodies generally show cross-cutting relationships. Total and partial chemical and modal analyses of Elbow Lake Stock are given in Table 6a, 6b, and 6c, the field location of samples is shown in Figure 2 see section "Metavolcanics and Metasediments".

Photo 10–Medium to large, angular, coarse-grained amphibolite xenoliths in a granitic groundmass, Elbow Lake Stock.

Photo 11–Large amphibolite xenoliths in a granitic groundmass (agmatite), Elbow Lake Stock.

TABLE 6A | CHEMICAL ANALYSES, ELBOW LAKE STOCK, TASHOTA AREA. CHEMICAL ANALYSES BY MINERAL RESEARCH BRANCH, ONTARIO DIVISION OF MINES.

CHEMICAL ANALYSES, MAJOR COMPONENTS IN PERCENT

Sample Number	A001	A60-1
Rock Type	Trondhjemite	Granodiorite
SiO_2	72.20	64.40
Al_2O_3	15.80	20.50
Fe_2O_3	0.46	0.71
FeO	1.14	1.05
MgO	0.13	0.36
CaO	2.91	3.63
Na_2O	4.78	7.02
K_2O	1.54	1.28
H_2O^+	0.29	0.34
H_2O^-	0.07	0.06
CO_2	0.21	0.12
TiO_2	0.17	0.21
P_2O_5	0.05	0.05
S	0.01	0.03
MnO	0.03	0.03
Total	99.80	99.80
S.G.	2.67	2.65

Abbreviation
S.G. Specific Gravity

TABLE 6B | PARTIAL CHEMICAL ANALYSES, ELBOW LAKE STOCK, TASHOTA AREA. CHEMICAL ANALYSES BY MINERAL RESEARCH BRANCH, ONTARIO DIVISION OF MINES.

CHEMICAL ANALYSES, MAJOR COMPONENTS IN PERCENT

Sample Number	A06-1	A88-2	A108-4	A147	A2024
SiO_2	64.80	69.50	74.40	71.90	68.60
Al_2O_3	16.00	16.60	13.20	16.70	16.50
Total Fe as Fe_2O_3	4.38	3.14	1.39	2.50	1.57
MgO	1.95	1.07	0.27	0.93	0.55
CaO	4.89	2.62	1.35	3.36	1.98
Na_2O	4.64	3.90	4.48	4.85	5.58
K_2O	1.18	3.87	2.82	1.09	2.27

Notes
Sample A06-1 is a Trondhjemite

TABLE 6C | MODAL ANALYSES OF ELBOW LAKE STOCK, TASHOTA AREA.

Sample Number	A1	A6-1	A108-4	A141	A2024	A60-1
Microcline	33.6	4.9	21.1	4.2	12.7	9.9
Sericite	-	1.4	1.0	8.4	12.2	5.5
Muscovite	-	-	-	-	-	-
Oligoclase (An)	20.2 (25)	52.5	39.8	49.1	43.5	70.0 (22)
Quartz	39.3	20.5	28.3	22.6	27.0	8.0
Biotite/chlorite Hornblende	5.6	18.4	8.7	13.3	2.2	5.5
Albite	Tr	Tr	Tr	Tr	Tr	Tr
Andesine	Tr	Tr	Tr	Tr	Tr	Tr
Calcite	Tr	Tr	Tr	Tr	Tr	Tr
Myrmekite	Tr	Tr	Tr	Tr	1.3	Tr
Other	1.3	1.7	1.1	2.4	1.1	1.1

Abbreviation
Tr Trace
- Not detected

FELSIC INTRUSIVE ROCKS

Gzowski Lake Stock

The Gzowski Lake Stock varies in composition from a hornblende-quartz monzonite to a biotite-hornblende quartz monzonite with minor hornblende monzonite phases. These rocks are massive, medium to coarse grained, equigranular, and are composed essentially of perthitic potassic feldspar, quartz, and sodic plagioclase (albite). A peculiar "fragmental-like" texture caused by pink staining believed to be the result of potash metasomatism along joint sets is well displayed on the southwestern shore of Gzowski Lake (Photo 12). Ayres (1972, p.6) stated:

> Plagioclase composed dominantly of albite is rare in granitic rocks and its presence should be recognized by appropriate nomenclature. Where present, it is either secondary, indicating alteration or metamorphism, or it is primary and indicates a rock of abnormal composition that may have economic connotations (of porphyry copper-molybdenite type).

Disseminated copper mineralization (chalcopyrite) was observed on the outcrop at the tip of the southwestern shore of Gzowski Lake. Mafic minerals compose less than 5 percent of the rock and consist of hornblende, biotite, muscovite, and chlorite. This rock also has unusually high 0.05 to 0.50 percent values of titanium (TiO_2) contained mostly in the mineral sphene, see section on "Economic Geology". Local variations within the stock include a progressive decrease in quartz so that the rock becomes a monzonite towards the contact with felsic pyroclastic rocks south of Little Gzowski Lake, the stock has a brick-red colour

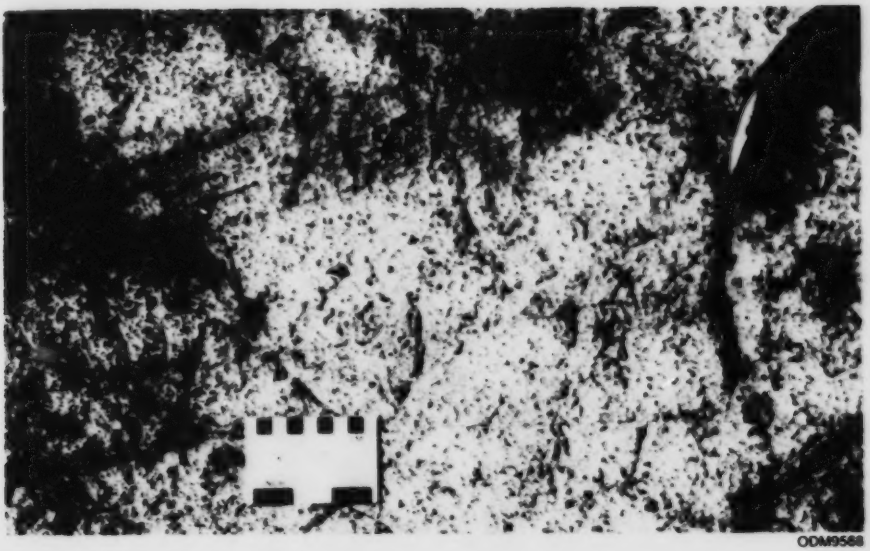


Photo 12–Pink staining (dark) and pseudo-fragmental texture believed to be the result of potash metasomatism, Gzowski Lake Stock.

near the Canadian National railway tracks just southwest of Little Gzowski Lake. Granitic dikes are sparse, but are well jointed.

The stock is extensively cut by faults which have been followed by streams and valleys. This has resulted in the development of very high linear erosional rock ridges. The only inclusions observed in the stock occur around Redmond Station where the stock is intruded by a coarse gabbroic-looking diabase dike.

Miarolitic cavities are common throughout the stock and might indicate the nature of the intrusion, it could possibly be a high-level type. Chemical and modal analyses of the Gzowski Lake Stock are given in Tables 7a, 7b and 7c. The field locations of the samples are shown in Figure 2 (see section on 'Metavolcanics and Metasediments'.

Robinson Lake Stock

The Robinson Lake Stock is composed mainly of massive to poorly foliated, coarse equigranular to porphyritic biotite-quartz monzonite. The composition and texture of the stock and other isolated but similar small bosses is very uniform. Country rock inclusions and diabase dikes are rarely found in the stock and related bosses. Hornblende is rare, and very locally developed. The typical rock is characterized by subhedral and randomly oriented perthitic microcline phenocrysts (35 percent), quartz (39 percent), zoned oligoclase plagioclase (20 percent), biotite (3 percent), with minor amounts of hornblende, chlorite or mus-

TABLE 7A CHEMICAL ANALYSES, GZOWSKI LAKE STOCK, TASHOTA AREA. CHEMICAL ANALYSES BY THE MINERAL RESEARCH BRANCH, ONTARIO DIVISION OF MINES.

CHEMICAL ANALYSES, MAJOR COMPONENTS IN PERCENT

Sample Number	A327	A334
SiO_2	74.70	62.40
Al_2O_3	12.90	16.00
Fe_2O_3	0.39	1.57
FeO	0.98	2.84
MgO	0.36	4.16
CaO	2.20	3.93
Na_2O	4.51	4.86
K_2O	2.68	3.11
H_2O^+	0.54	0.91
H_2O^-	0.08	0.08
CO_2	1.38	0.15
TiO_2	0.19	0.46
P_2O_5	0.09	0.20
S	0.08	0.01
MnO	0.02	0.09
Cr	0.07	0.00
Sr	0.03	0.04
Total	101.10	100.80
S.G.	2.65	2.75

Abbreviation
S.G. Specific Gravity

TABLE 7B PARTIAL CHEMICAL ANALYSES, GZOWSKI LAKE STOCK, TASHOTA AREA. CHEMICAL ANALYSES BY MINERAL RESEARCH BRANCH, ONTARIO DIVISION OF MINES.

CHEMICAL ANALYSES, MAJOR COMPONENTS IN PERCENT

Sample Number	A291-1	A330	A366-3
SiO_2	67.70	67.60	67.70
Al_2O_3	16.60	16.40	15.20
Total FeO as Fe_2O_3	3.78	3.07	3.39
MgO	1.63	1.12	0.93
CaO	2.62	2.53	2.74
Na_2O	4.96	5.10	4.48
K_2O	3.82	3.14	1.11
MnO	ND	ND	0.04
TiO_2	ND	ND	0.23

TABLE 7C | MODAL ANALYSES, GZOWSKI LAKE STOCK, TASHOTA AREA.

Sample Number	A292	A327	A330	A334	A366-3
Microcline	26.3	15.9	25.7	23.7	0.0
Sericite	10.0	0.8	4.7	10.8	9.5
Muscovite	Tr	Tr	Tr	Tr	Tr
Oligoclase	41.3	27.5	40.8	33.1	38.8
(An)		(14)		(19)	
Quartz	13.8	26.6	10.5	7.5	36.2
Biotite/chlorite	5.1	4.5	3.3	22.1	15.0
Hornblende	2.6	Tr	5.6	Tr	Tr
Albite	Tr	20.0	Tr	Tr	Tr
Andesine	Tr	Tr	Tr	Tr	Tr
Calcite	Tr	3.9	Tr	Tr	Tr
Myrmekite	Tr	Tr	1.1	1.0	Tr
Other	0.9	2.6	2.1	1.8	0.5

Abbreviation
Tr Trace amounts

TABLE 8A | CHEMICAL ANALYSES, ROBINSON LAKE STOCK, TASHOTA AREA. CHEMICAL ANALYSES BY THE MINERAL RESEARCH BRANCH, ONTARIO DIVISION OF MINES.

CHEMICAL ANALYSES, MAJOR COMPONENTS IN PERCENT

Sample Number	A2096
SiO_2	70.80
Al_2O_3	15.60
Fe_2O_3	0.63
FeO	1.46
MgO	0.78
CaO	1.79
Na_2O	3.88
K_2O	4.24
H_2O^+	0.57
H_2O^-	0.11
CO_2	0.11
TiO_2	0.31
P_2O_5	0.08
S	0.01
MnO	0.05
Total	100.40
S.G.	2.61

Abbreviation
S.G. Specific Gravity

TABLE 8B | PARTIAL CHEMICAL ANALYSES, ROBINSON LAKE STOCK, TASHOTA AREA. CHEMICAL ANALYSES BY MINERAL RESEARCH BRANCH, ONTARIO DIVISION OF MINES.

CHEMICAL ANALYSES, MAJOR COMPONENTS IN PERCENT

Sample Number	A123-2	A133	A172	A174
SiO_2	73.80	70.50	69.70	70.80
Al_2O_3	15.50	16.30	15.80	15.30
Total Fe as Fe_2O_3	1.91	1.73	3.61	3.04
MgO	0.46	0.46	1.39	0.93
CaO	2.20	2.40	2.87	2.79
Na_2O	4.96	5.02	4.01	3.88
K_2O	1.88	1.93	3.17	3.55

TABLE 8C | MODAL ANALYSES, ROBINSON LAKE STOCK, TASHOTA AREA.

SAMPLE NUMBER	A174	A2096
Microcline	15.5	35.6
Sericite	12.2	4.5
Muscovite	Tr	Tr
Oligoclase	39.4	33.6
(An)	(24)	(25)
Quartz	17.0	19.3
Biotite/chlorite	11.6	4.8
Hornblende	3.0	Tr
Albite	Tr	Tr
Andesine	Tr	Tr
Calcite	Tr	Tr
Myrmekite	Tr	1.2
Other	1.3	1.0

Abbreviation
Tr Trace amounts

covite. Sphene and epidote are the major accessory minerals. Chemical and modal analyses are given in Table 8a, 8b, and 8c. The field location of each sample is shown in Figure 2 (see section on 'Metavolcanics and Metasediments').

The age relationship between the Robinson Lake Stock and the Gzowski Lake Stock is difficult to establish because the two stocks are not in contact at surface. The Elbow Lake Stock is intruded by the Robinson Lake Stock and is therefore older. The Elbow Lake Stock is composed partly of gneiss and migmatite (minor amounts of agmatite); it is also extremely to moderately well foliated. Finally, it has been noted by Ayres (personal communication 1973) that in northern Ontario, the potassium content of granitic rocks increases from older to younger intrusions. The Elbow Lake Stock is potassium poor, and there is considerably more potassic feldspar in the Robinson Lake Stock than in the Gzowski Lake Stock.

PETROGRAPHY

Figure 3 shows the critical parameters used in the modal classification of granitic rocks by the Ontario Division of Mines (Ayres 1972, p.2) and is utilized in an attempt to distinguish the three stocks petrographically. Further plots, namely quartz-potassic feldspar-plagioclase (Figure 4) and quartz-feldspar-mafic minerals (Figure 5) are used to show compositional variations within the three stocks in the Tashota area.

MIDDLE AND LATE PRECAMBRIAN (PROTEROZOIC)

Mafic Intrusive Rocks

Swarms of late diabase dikes intrude all older Precambrian rocks. These dikes can be grouped according to texture, attitude, and to a lesser extent by texture and composition. Isotopic dates of these rocks are unavailable.

The four predominant dike directions are northwest, northeast, north-northeast, approximately north and east. The first dike direction, northwest, and is parallel to the predominant joint direction in the vicinity of Gzowski Lake where these dikes are widespread. The northeast set is also concentrated in the Gzowski Lake Area, and the strike direction is parallel to the predominant fault direction of this area. There are only a few diabase dikes that strike near north (north-northeast). One of these dikes is located at the tip of the southwestern shore of Gzowski Lake and the others are found within the area around this lake in the Gzowski Lake Stock and adjacent mafic metavolcanics. There are only two diabase dikes that strike east. One is located along the old logging road south of Robinson Lake on the northwest-central edge of the map-area; and the other dike occurs northeast of Knucklethumb Lake, north of the cabin on Oboshkegan Lake (Map 2354, back pocket).

The texture of the dike rocks seems to be controlled by the dike thickness, and hence probably by the cooling rate. The fine-grained dikes are only about 60 cm (a few feet) wide and can be traced laterally for only about 60 m (a few hundred feet). Examples are the east-trending dike on the old logging road south of Robinson Lake, the north-northwest striking dike at the tip of the southwestern shore of Gzowski Lake. The rest of the dikes range in width from 6 to 60 m (20 to 200 feet) and can be traced along strike for up to several thousand feet. The rocks are medium to coarse grained, variably porphyritic, and located in all older Precambrian rocks in the map-area. Thin section examination reveals sub-ophitic and diabasic textures (Photos 13 and 14) with occasional micrographic intergrowths in the diabase dikes.

The dikes consist of 50 to 60 percent calcic plagioclase (An_{55} to An_{65}) core to An_{35} to An_{50} at rim of crystals), titaniferous augite (30 to 45 percent), minor quartz, epidote, chlorite, magnetite, apatite, and olivine. Modal analyses of these rocks are given in Table 9b. The chemical analyses of dikes (Table 9a) are plotted on an AFM diagram (see Figure 10) and indicate that the dikes have a tho-

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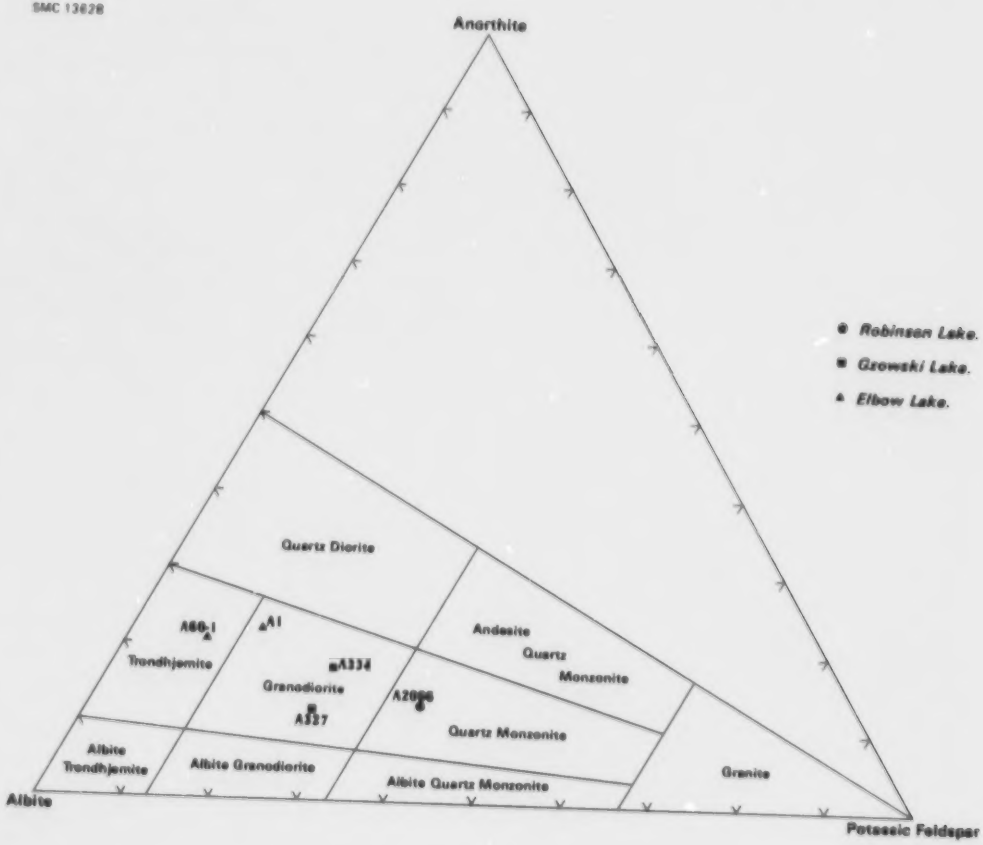

Figure 3–Potassic feldspar-albite-anorthite diagram for rocks from the Elbow Lake, Gzowski Lake, and Robinson Lake Stocks, Tashota Area; after Ayres, (1972, p.2).

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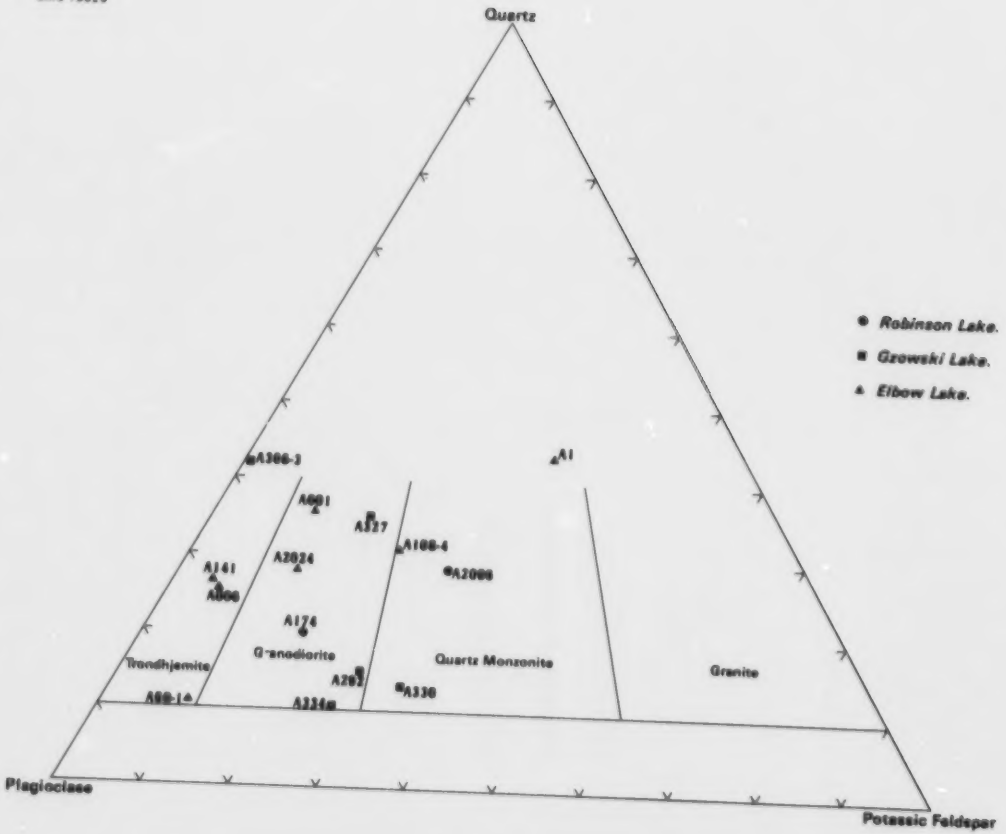

Figure 4- Quartz-potassic feldspar-plagioclase diagram for rocks from the Elbow Lake, Gzowski Lake, and Robinson Lake Stocks, Tashota Area; after Ayres (1972, p.2).

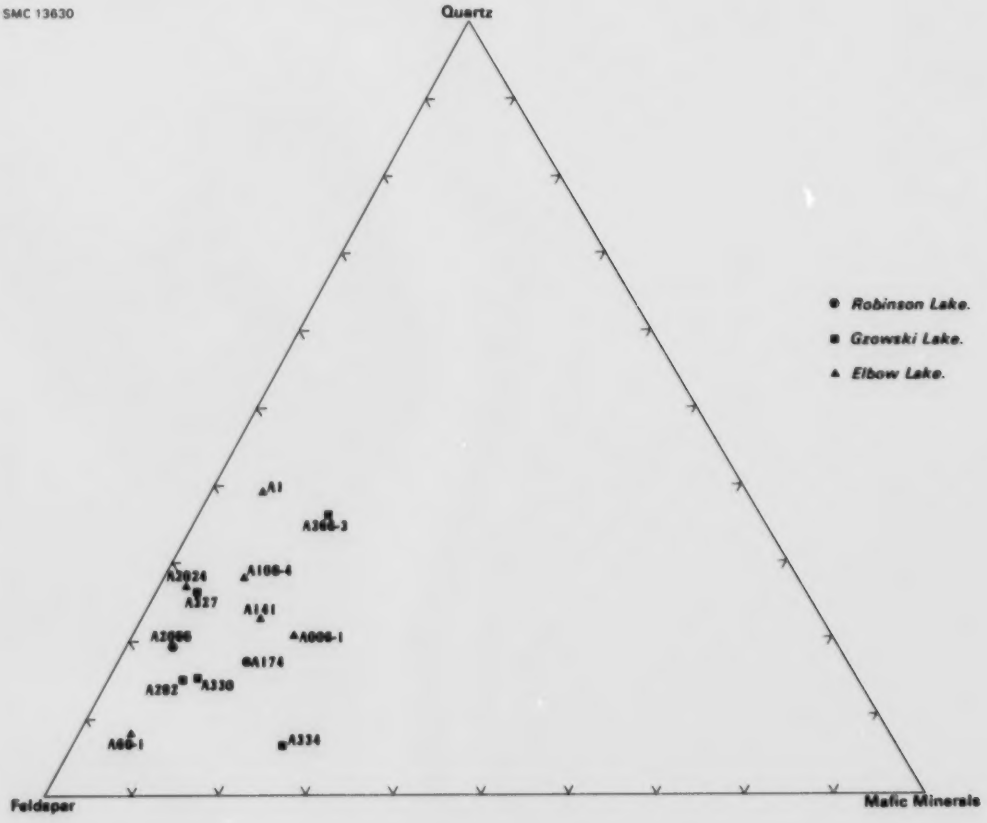

Figure 5–Quartz-feldspar-mafic minerals diagram for rocks from the Elbow Lake, Gzowski Lake, and Robinson Lake Stocks, Tashota Area.

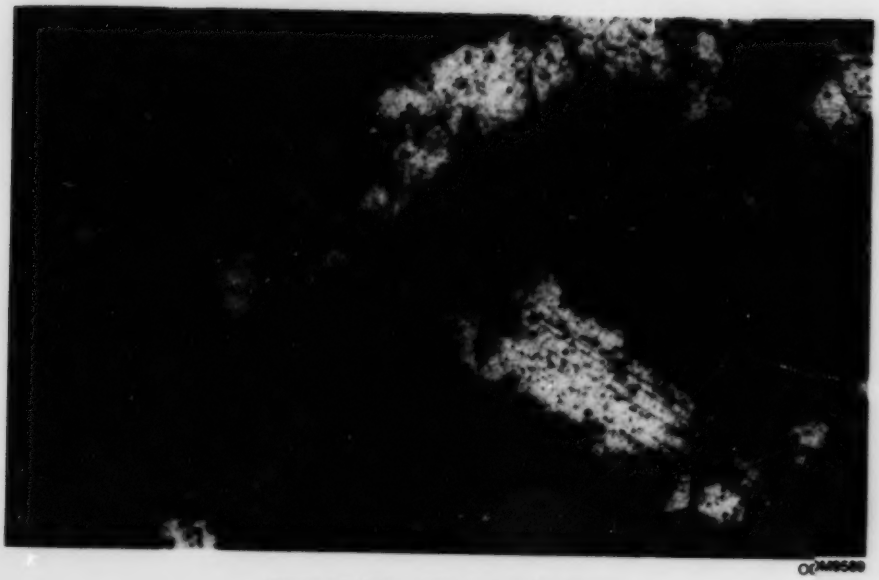

Photo 13–Sub-ophitic texture in diabase.

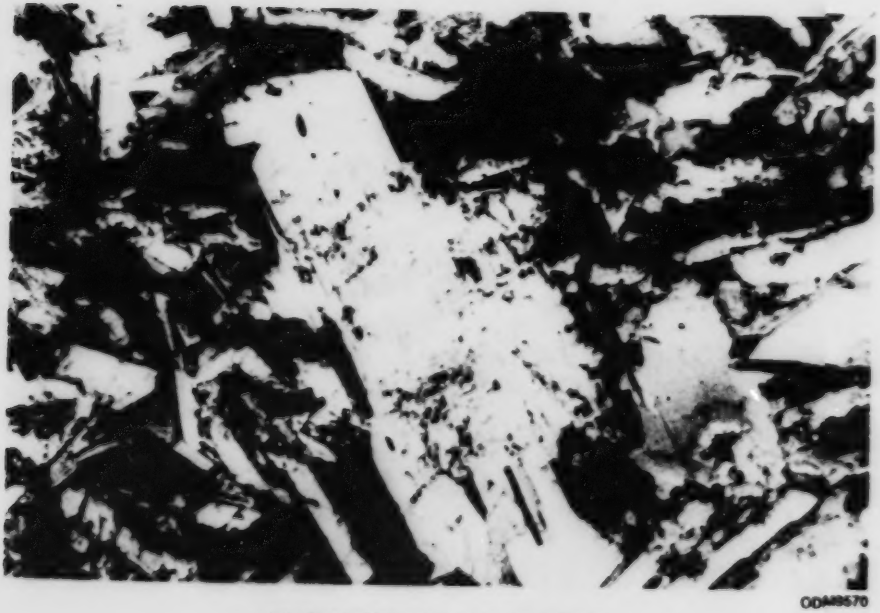

Photo 14–Diabasic texture in diabase.

TABLE 9A CHEMICAL AND PARTIAL CHEMICAL ANALYSES OF DIABASE DYKES FROM THE TASHOTA AREA. CHEMICAL ANALYSES BY MINERAL RESEARCH BRANCH, ONTARIO DIVISION OF MINES.

CHEMICAL ANALYSES, MAJOR COMPONENTS IN PERCENT

Sample Number	A370-2	A2007		A69
SiO_2	52.20	51.00		52.80
Al_2O_3	13.30	15.70		13.50
Fe_2O_3	2.53	2.12	Total Iron as Fe_2O_3	13.30
FeO	11.40	10.60		ND
MgO	5.50	5.19		5.55
CaO	9.00	9.22		8.58
Na_2O	2.32	2.35		3.62
K_2O	0.68	1.01		0.82
H_2O^+	1.28	1.68		ND
H_2O^-	0.11	0.06		ND
CO_2	0.37	0.15		ND
TiO_2	1.50	1.35		1.90
P_2O_5	0.18	0.14		ND
S	0.12	0.09		ND
MnO	0.25	0.23		0.22
Total	100.70	100.90		
S.G.	3.04	3.04		

Abbreviations
S.G. Specific Gravity
ND Not determined

TABLE 9B MODAL ANALYSES, DIABASE, TASHOTA AREA. .

Sample Number A368-2

Mineral	Point Count	Percentage
Plagioclase	184	36.4
Augite	179	34.4
Uralite	88	14.4
Magnetite	72	13.7
Green chlorite	6	1.1
Other	1	0.1
Total	530	99.7

leiitic basalt composition (Irvine and Baragar 1971).

Some of the diabase dikes form high, resistant ridges that are easily recognizable linear features on vertical aerial photographs. Most of these ridges contain enough magnetic minerals to affect a compass on the ground, but do not appear on Aeromagnetic Map 2137G (ODM-GSC 1962) as positive magnetic intensity linears. Magnetic pyrrhotite, pyrite, and minor magnetite were seen in hand specimens. Disseminated pyrite, pyrrhotite, and trace amounts of chalcopyrite and gold were also recorded in the samples collected by the field party and analyzed by Mineral Research Branch, Ontario Ministry of Natural Resources from the dike at the tip of the southwestern shore of Gzowski Lake (see section on "Economic Geology").

Phanerozoic

CENOZOIC

Quaternary

PLEISTOCENE

Direction of Ice Movement

Glacial striae were not observed by the author and his assistants. Zoltai (1967, p.517) using glacial striae and glacially oriented features, such as drumlins and eskers, concluded that the general direction of ice movement in the area was southwest, fanning out to the west and south. Zoltai (1967) also inferred an earlier ice movement due to the existence of a few crossing striae that occur locally. The Pleistocene deposits are glacial, glaciofluvial, and glaciolacustrine.

Glacial Deposits

Ground moraine is the most widely occurring glacial deposit. Two types of ground moraine are described by Zoltai (1967), the most widely occurring type is a sandy till which consists mainly of rock fragments. Other glacial features are drumlins of various shapes and sizes.

Glaciofluvial Deposits

The Onaman Interlobate Moraine (Zoltai 1965, 1967; and Moore 1909) is a distinct physiographic glaciofluvial feature that trends southwest across the map-area. The moraine forms a continuous high ridge rising to as much as 46 m (150 feet) above the general level of the surrounding ground, and contains stratified and crossbedded sand and gravel, which exceeds 30 m (100 feet) in thickness around Tashota (Kindle 1931). Glaciofluvial deposits include eskers, especially in the central part of the map-area (Map 2354, back pocket) and outwash deposits. The composition of eskers and outwash deposits is similar to the interlobate moraine.

Glaciolacustrine Deposits

Clay and silt, with very little sand or till, derived by lacustrine wave action are restricted to valleys of rivers and occur only very locally. Calcareous varved clay and deltaic deposits are reported in the surrounding country by Zoltai (1967, p.523).

RECENT

Two types of Recent deposits occur (Zoltai 1967, p.524) as follows:

Organic Deposits

Two types of organic deposits are extensive in the map-area, they are: 1) low, spongy terrain generally saturated with moisture, with trees and aquatic vegetation. In this class are included swamps such as cedar, spruce, and open swamp, and muskeg. 2) Peat deposits composed of dark organic mud produced by the partial decomposition and disintegration of mosses, trees, and other plants that grow in wet places. This type of deposit occcurs in shallow lakes, swamps, and muskegs.

Floodplain Deposits

These are composed of lacustrine and fluvial clay, silt, and sand which are being produced by rivers actively eroding their banks and depositing the material in larger rivers or lakes. Its occurrence is localized in sections of the larger rivers such as the Onaman River and Gzowski Creek.

STRUCTURAL GEOLOGY

The map-area lies near the median line of the east-northeast-trending Volcanic Belt of the Wabigoon Subprovince within the Superior Structural Province, about 30 km (20 miles) north of the east-trending Geraldton–Beardmore Metavolcanic-Metasedimentary Belt.

The rocks of the Tashota area have been severely deformed and altered, and exhibit penetrative deformation produced by regional tectonic events of Early Precambrian age. A description of the penetrative features is given below.

Foliation

The foliation is defined by the subparallel orientation of mica, chlorite, and amphibole, and the elongation of pyroclastic fragments, pebbles and pillows. Most of the metavolcanics have a well-developed metamorphic foliation, but the rocks of the Elbow Lake Stock have an apparent primary foliation or flow structure. All foliations are plotted with one symbol on the map and include the following types:

1) Metamorphic foliation produced by contact and regional metamorphism.

2) Cataclastic foliation developed along fractures, shears, and faults. This type of foliation is easily recognized in the field by the occurrence of chlorite and sericite schist, and was used to trace major shears and faults. The best examples are located in the following areas: 1) in the central part of the map-area 1200 m (4,000 feet) south of Hull Lake, and 2400 m (8,000 feet) north of Shed Lake. This area consists of a highly weathered gossan and sheared quartz porphyry rock containing over 10 percent sericite, quartz, plagioclase, over 5 percent pyrite, and about 1 percent pyrrhotite, b) about 2400 m (8,000 feet) south of Wells Lake is an outcrop of pillowed metabasalt that has been sheared into a crumbly rock that consists of chlorite, carbonate, feldspar, and other dark minerals (Photo 15).

3) Axial planar foliation is a later metamorphic foliation that can obliterate regional metamorphic foliation.

4) Schistosity is a variety of foliation that occurs in schist, generally resulting from a combination of (1) and (2) and is best displayed in amphibolites and migmatites.

5) Cleavage. In the map-area slaty cleavage is well developed in some metasediments, and fracture cleavage, a closely spaced jointing is occasionally present in the gneisses and migmatites.

6) Gneissosity. The slight foliation in the Robinson Lake and Gzowski Lake Stocks appears to be caused by original igneous flow structure, it is a primary gneissosity; but in the quartz-feldspar-amphibole gneiss and migmatite at the margins between the Elbow Lake Stock and the mafic metavolcanics, and in some granitic rocks, a metamorphic gneissosity which was probably related to granitic intrusion was recorded.

Lineation

A lineation produced by preferred orientation of mafic minerals plunges steeply in the foliation (axial planar) planes in minor and major fold axes. The secondary lineation produced by intersection of foliation and bedding is common on the southern shore of Knucklethumb Lake, and throughout the metasediments. A possible additional lineation (not convincingly documented by field work) occurs in the fragmental rocks where the regional foliation intersects the lenticular direction of the stretched fragments obliquely. In addition to the

ODM9571

Photo 15–Cataclastic foliation on a pillowed metabasalt outcrop 2400 m (8,000 feet) south of Wells Lake.

above lineation, lineation features produced mainly by intersections of two or more sets of superimposed planar structures, linear tectonic planar structures, (rodding), and stretched primary structures (clasts, fragments, pillows) are also recorded.

Joints

Joints are omnipresent in the map-area, and are strongly developed in the Gzowski Lake Stock, and in the diabase dikes. In the Elbow Lake Stock, numerous periods of joint formation can be recognized by cross-cutting relationships. Each joint set is invariably filled with pegmatite, aplite, and other granitic material. The Gzowski and Robinson Lake Stocks, diabase, and some metavolcanics are cut by closely spaced joint sets that contain epidote and/or chlorite. Red hematite stains located on an outcrop along the Canadian National Railway tracks southwest of Little Gzowski Lake are concentrated on joint surfaces.

A computer plot of joint directions in two sub-areas of the area is presented in Figures 6 and 7; the field location of areas studied is shown in Figure 2.

Discussion of Computer Plots

A computer plot illustrating joint attitude/frequency using jointing data recorded in the field was obtained utilizing a McMaster University computer program. The resulting contour diagrams of poles to jointing in two areas, namely the Gzowski and Elbow Lake sub-areas are presented in Figures 6 and 7 respectively, and the boundary of the two sub-areas is shown in Figure 8.

In Figure 6 there are two predominant joint directions, the northwest and northeast directions. The northwest set, the most predominant one, is parallel to the strike of the major diabase dikes (Map 2354, back pocket) of this area. The northeast set is parallel to the predominant fault and foliation directions (Map 2354, back pocket). The two joint directions are at right angles to one another.

In Figure 7, the predominant joint directions are: north-northwest, north-northeast and east. These directions intersect the direction of the major faults of the area obliquely at small to medium angles (Map 2354, back pocket). The north-northwest and east directions are parallel to two local foliations within the Elbow Lake area (Map 2354, back pocket).

Folding

In the map-area, essential fundamental structural information is lacking. Location of axial-plane traces of major folds shown in Figure 9 was interpreted from crossbedding, and graded bedding, and a few reliable pillow top determinations (Map 2354, back pocket) augmented by available geophysical data (ODM-GSC 1963a, 1963b, 1965). A synform-antiform pair is centred around Knucklethumb, McDonough, Shed and Metcalfe Lakes. The northeasterly trending axial planes of this structure appears to be offset by the major faults. The nature and style of folding is not evident, but dips and lack of closure imply the existance of isoclinal folds. Major folding apparently post dates emplacement of mafic intrusive rocks, but predates the emplacement of the granitic rocks.

Minor folds such as drag, kink, isoclinal, and similar folds are widespread, especially within volcaniclastic and iron formation units (Photo 7, see subsection on "Metasediments").

Because outcrops are sparse, and only scanty data is available, observations on minor and major folds can only be considered preliminary.

Faulting

Many faults were recognized using the following criteria: 1) aerial photo lineaments (positive and negative); 2) straight, non-meandering river sections; 3) high ridges (scarps); 4) schistose, crushed and mylonitized wallrock; 5) wallrock alteration plus accompanying silicification; 6) strongly developed close-spaced joint sets, and 7) lithologic or structural offsets. The direction and manner of

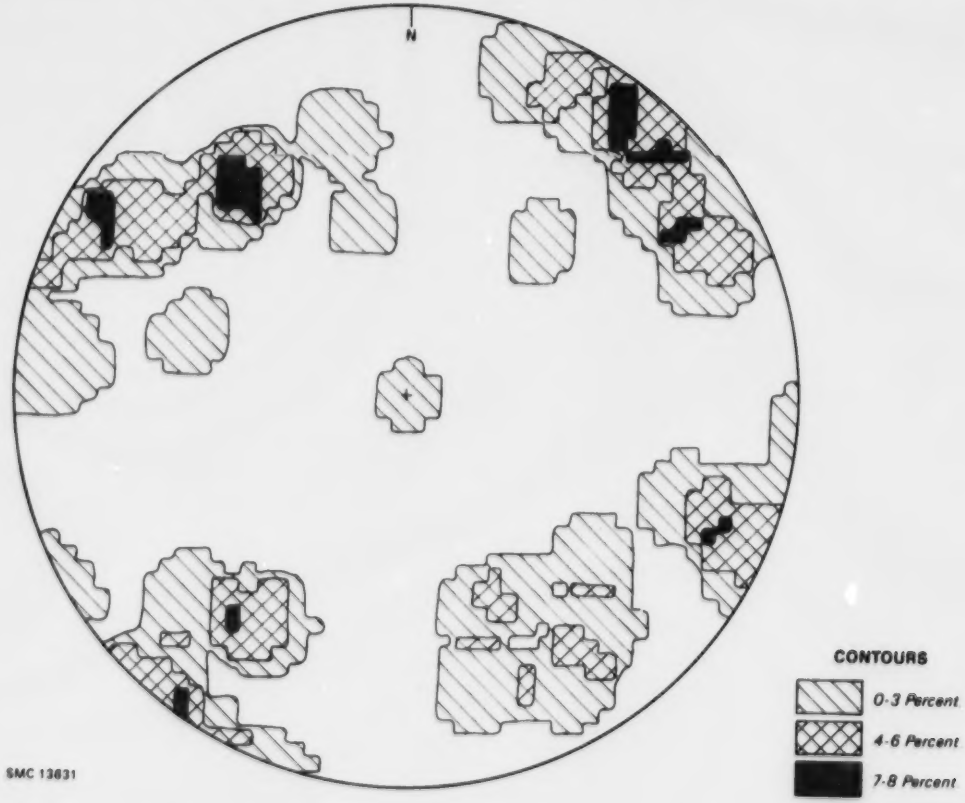

Figure 6–Equal area projection of poles to jointing planes, Gzowski Lake Subarea, 30 observations. Diagram taken from McMaster University Computer Programme.

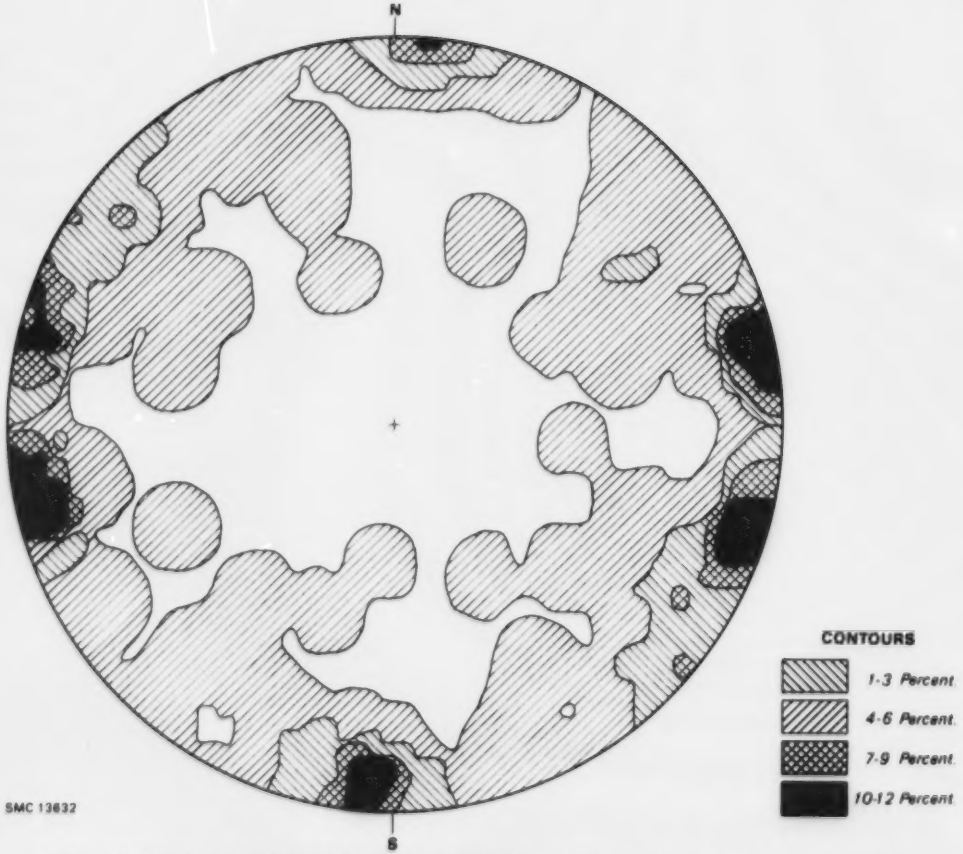

Figure 7–Equal area projection of poles to jointing planes. Elbow Lake Subarea, 79 observations. Diagram taken from McMaster University Computer Programme.

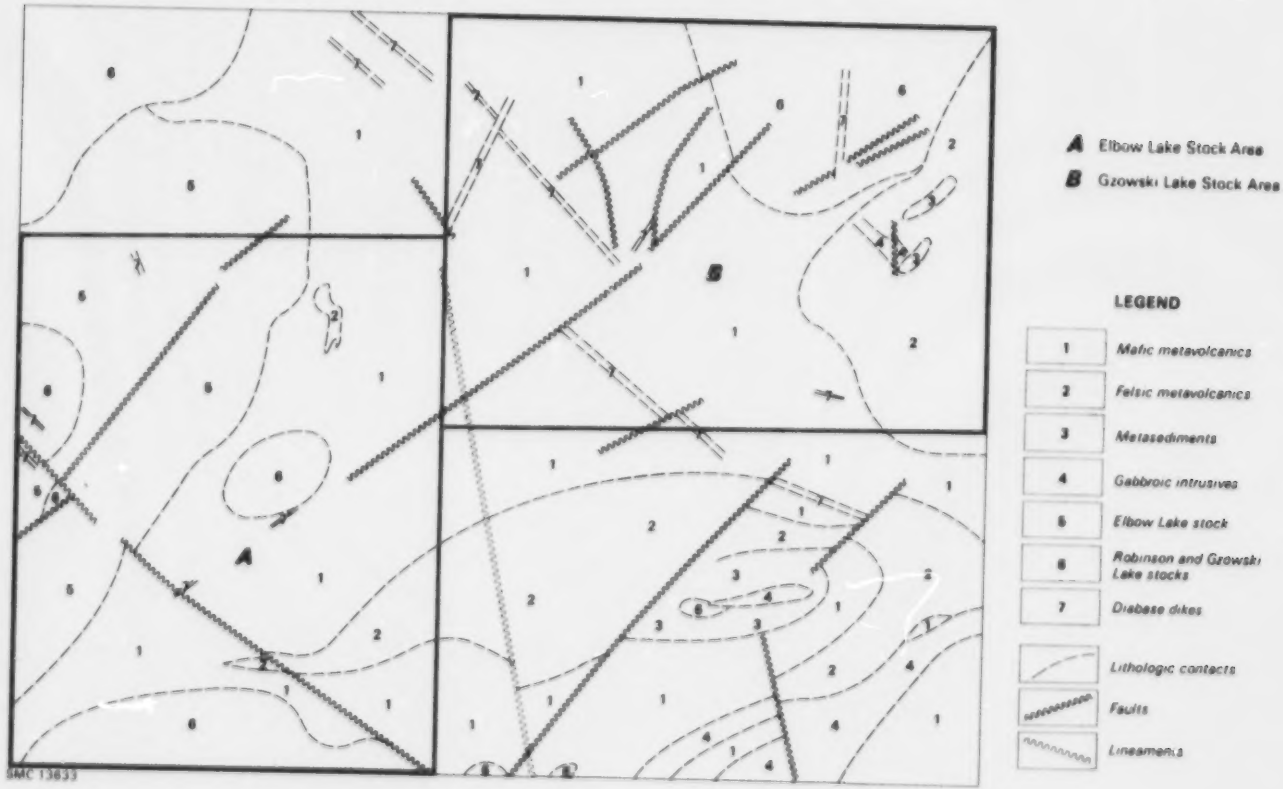

Figure 8–Sketch map showing boundaries of Gzowski Lake and Elbow Lake Subareas.

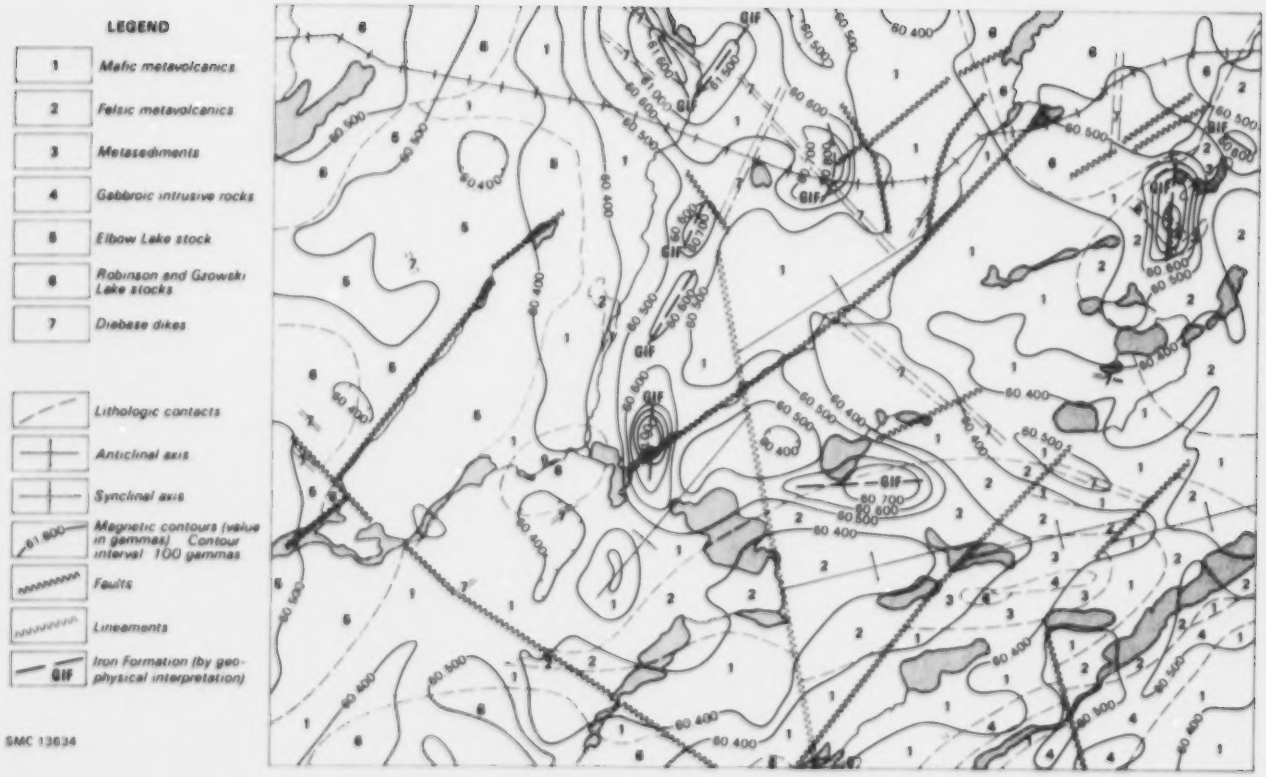

Figure 9–Correlation between geology and aeromagnetic data, in the Tashota Area.

movement of these faults is unknown, but there are two trend directions, namely the north-northeast and west-northwest trends. The north-northeast set varies between N10°E and N45°E is concentrated around the Gzowski Lake Stock. A majority of these faults offset the diabase dikes (and the west-northwest set) and are presumed to represent the youngest tectonic event. The west-northwest set varies between N25°W and N45°W and predominantly cuts the granitic gneisses of Elbow Lake Stock. In the mafic metavolcanics, the surfaces of some of these faults have been filled by diabase dikes.

CORRELATION OF GEOLOGY WITH AEROMAGNETIC DATA

The map-area is part of the area covered by airborne magnetic surveys of the ODM-GSC (1963a; 1963b) and shown on Aeromagnetic Maps 2137G and 2138G, scale 1:63,360 (1 inch to 1 mile) and on Map 7120G, scale 1:253,440 (1 inch to 4 miles) (ODM-GSC 1965).

The comparison of the Aeromagnetic Map of the area (ODM-GSC 1963a, 1963b) with the geology of the map-area (Map 2354, back pocket), as presented in Figure 9, shows a good correlation between major folds, iron formation areas, and magnetic intensity.

The background value of all the rocks outside the iron formation and the major fold area is generally of the magnitude of 60,400 to 60,500 gammas (ODM-GSC 1963a; 1963b). Furthermore, most of the diabase dikes contain enough magnetic material to affect the compass, but the diabase dikes do not outline magnetic intensity linears that can be recognized. The correlation between rock types is probably poor because of the low (+100 gammas) magnetic intensity contrast in areas outside iron formation and major folds.

The most notable features of the aeromagnetic maps are the correlations between the following;

1) The distribution of sulphide iron formation areas. These areas have positive anomalous magnetic intensity readings of 300-1,200 gammas, and these areas are located: a) south of Tashota Lake (up to +61,600 gammas); b) northeast of Devanney Lake (up to +60,800 gammas); c) southeast of Devanney Lake (up to +60,700 gammas); d) east of the old Adair Prospect (see "W.J. Cummer (4)") (up to +60,600 gammas); e) northeast of McDonough Lake (up to +61,000 gammas); f) southeast of Hull Lake (up to +60,700 gammas); g) southwest of and west of Crescent Lake (up to +60,900 gammas); and h) northeast of Crescent Lake (up to +60,600 gammas). Except for the area around Crescent Lake, the iron formation does not outcrop in the map-area, but has been intersected at depth in the outlined areas by diamond drilling (Assessment Files Research Office, Ontario Ministry of Natural Resources, Toronto) and reported to contain pyrite, pyrrhotite, graphite, and magnetite. The Crescent Lake iron formation is exposed, and was also tested by diamond drilling. The exposed outcrops are composed of graphitic argillite and quartzite containing pyrite, pyrrhotite, and magnetite.

2) The location of major folds. A major antiform-synform fold pair the axes of which are interpreted to be located around Knucklethumb and

McDonough Lakes in which a magnetic intensity contrast of +300 gammas is indicated. The magnetic contours show a good correlation with the fold pair (Figure 9).

PETROCHEMISTRY

No chemical data about Tashota area rocks have previously been reported in the literature. In the field, the volcanic rocks were classed either as mafic or felsic on the basis of colour index and megascopic mineralogy, and were further subdivided by textural and/or structural properties. Because there are relatively few rocks of intermediate composition in the area, this classification was adequate. However, magmatic differentiation trends could not be determined until the rocks were analyzed chemically. The mafic intrusive rocks and diabase were distinguished in the field by their textural properties and field occurrence; i.e. whether they cut across country rocks (dikes) or were conformable to the host rocks (sills). Their compositions are compared to those of volcanic rocks in Figures 10 and 11. Granitic rocks were stained in the field using a variation of Chayes's (1952) method in which the rocks were immersed in dilute hydrochloric acid before being treated with hydrofluoric acid and sodium cobaltinitrite (Solar *et al.* 1972). The rocks were then classified according to Ayres (1972) scheme. Later, the rock name was confirmed for each sample after chemical and petrographic analyses.

A total of 67 rocks were collected for whole rock (20 samples), partial (32 samples) and modal (15 samples) analyses. Chemical analyses were done by the Mineral Research Branch, Ontario Division of Mines, for the following rocks: 13 mafic volcanic rocks, 13 felsic volcanic rocks, 5 sedimentary rocks, 1 mafic intrusive rock, 17 "granites" and 2 samples of diabase. The chemical, partial chemical, modal analytical results, and field numbers are given in Tables 2 to 9.

The classification of the volcanic rocks and their differentiation trends used in this report is based on the parameters proposed by Irvine and Baragar (1971). All the mafic volcanic rocks and associated mafic intrusive rocks fall within the tholeiitic basalt field, whereas the felsic volcanic rocks are of calc-alkaline rhyodacite to rhyolite affinity, as shown in Figure 10. There is a distinct paucity of intermediate rocks. This break, known as the "Daly Gap" (Daly 1925; Yoder 1973) is equally pronounced on the SiO_2 versus total iron plot (see Figure 11) where only two rocks fall in the area of SiO_2 content between 54 and 66 percent. The volcanic rocks are potassium poor according to Descarreux (1972), this report Figure 12.

Using the classification of Ayres (1972), the rocks of the Elbow Lake Stock range in composition (see Figure 2) from trondhjemite to granodiorite, the Gzowski Lake Stock is composed of a hornblende phase, and the Robinson Lake Stock of a biotite phase within a quartz monzonite subseries. Ayres (1972) has observed that in Northern Ontario there is a general enrichment in potassium from older to younger granitic intrusions. The Elbow Lake Stock is older than the Robinson Lake Stock, and it is possible that the granitic rocks in the Tashota area form intrusive series in which later phases were enriched in potassium.

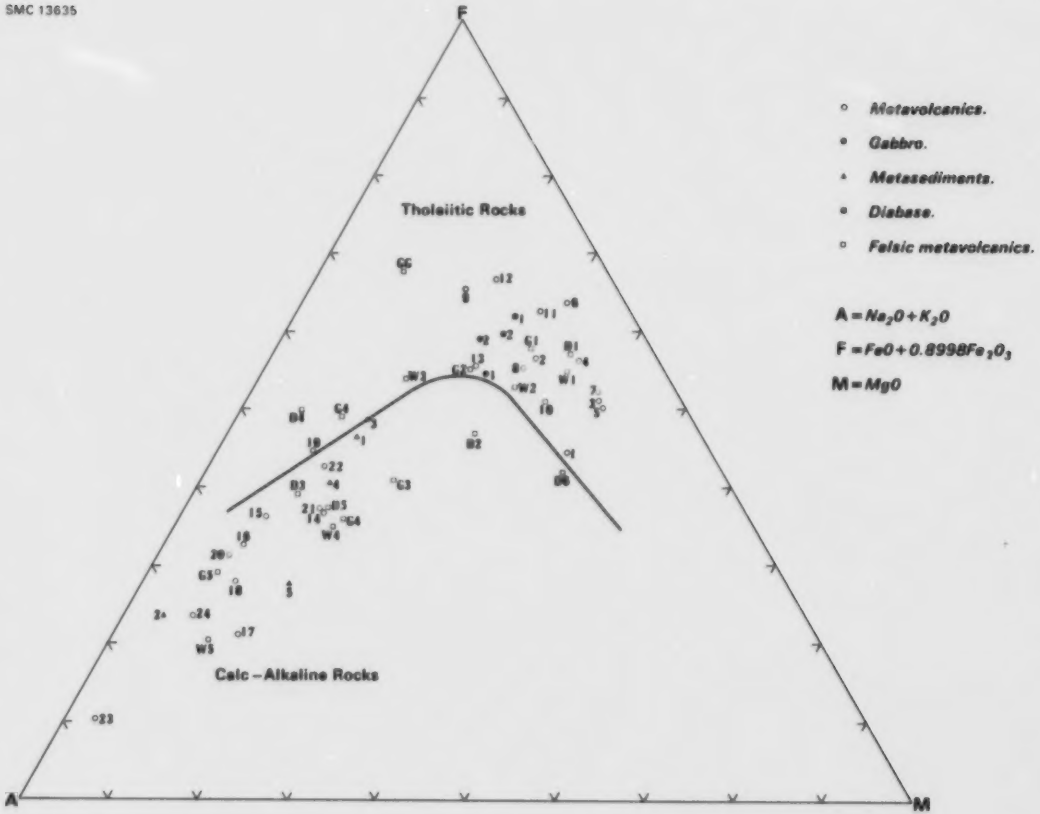

Figure 10–AFM plot showing the chemical variations within Tashota rocks (after Irvine and Baragar 1971).

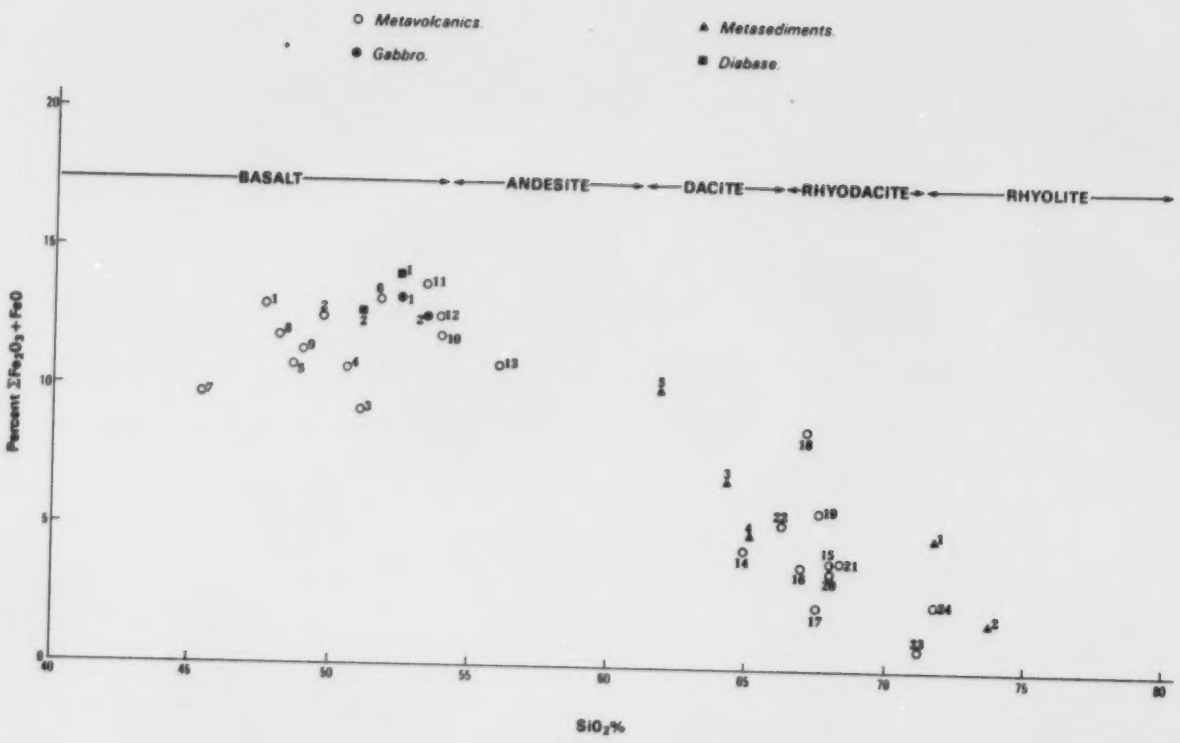

Figure 11–(Fe_2O_3 + FeO) : SiO_2 variation diagram for rocks from the Tashota Area (after Descarreaux 1972).

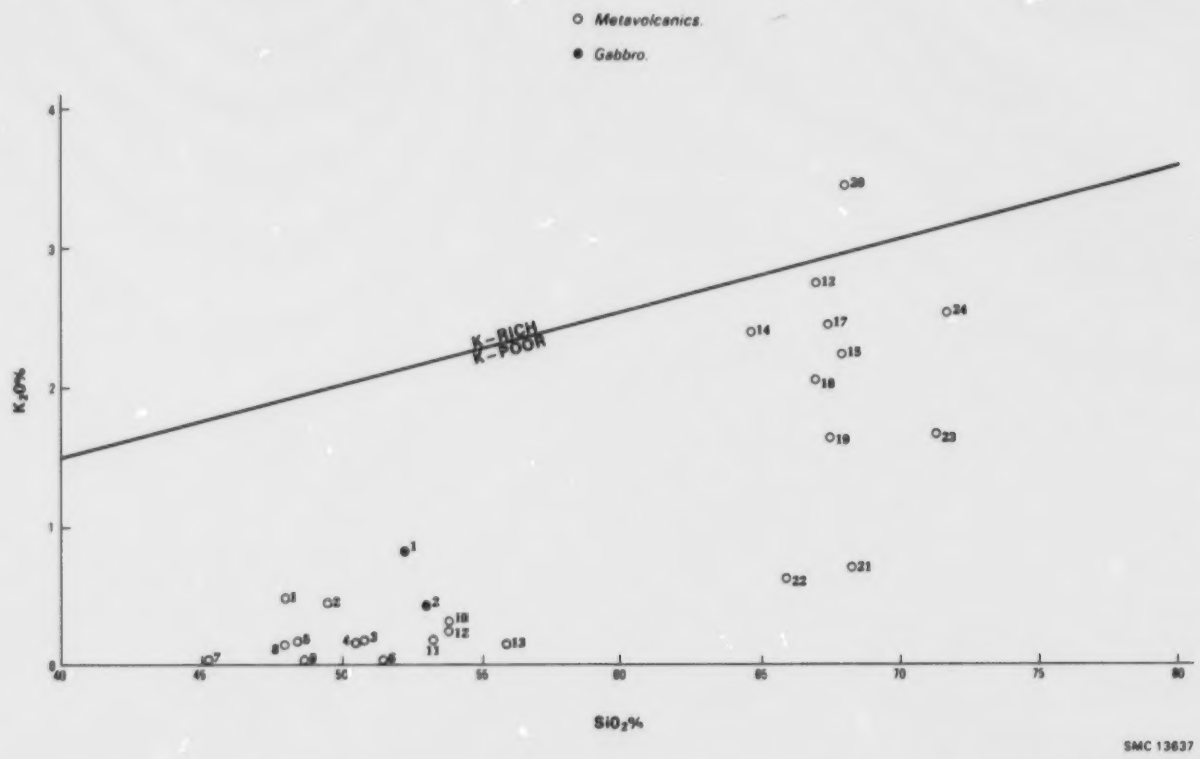

Figure 12–K_2O : SiO_2 variation diagram for rocks from the Tashota Area (after Descarreaux 1972).

TABLE 10 | FIELD NUMBERS OF SAMPLES PLOTTED IN FIGURES 10 TO 12, TASHOTA AREA.

Figure Number	Field Name	Field Number
Metavolcanics		
1.	Mafic metavolcanic rock	A 36-1
2.	Hornblende schist (derived-mafic volcanic rock)	A 111-1
3.	Recrystallized andesite to basalt	A 271-2
4.	Olivine basalt (pillowed)	A 368-1
5.	Chlorite schist (derived-mafic volcanic rock)	A 372-1
6.	Mafic metavolcanic rock	A 2059
7.	Olivine metabasalt (pillowed)	A 2126-1
8.	Olivine metabasalt (nonpillowed)	A 2126-2
9.	Andesite	A 2196
10.	Mafic metavolcanic rock	A 82
11.	Meta-andesite or basalt	A 396
12.	Porphyritic metabasalt and andesite	A 2198
13.	Meta-andesite	A 2208
14.	Felsic tuff-breccia	A 2167
15.	Rhyolitic quartz porphyry	A 201
16.	Rhyolitic quartz porphyry	A 231
17.	Intermediate to felsic tuff	A 344-2
18.	Felsic lapilli-tuff	A 2068-2
19.	Felsic metavolcanic rock	A 2124(B)
20.	Metadacite to rhyolite	A 2125
21.	Felsic lapilli-tuff	A 2174
22.	Meta-rhyolitic tuff	A 2204
23.	Meta-rhyolitic porphyry	A 2127
24.	Meta-rhyolitic quartz porphyry	A 204
G1. Goodwin (1967)	Average basalt	
W1. Wilson *et al.* (1965)	Average basalt	
D1. Descarreaux (1972)		8DX 127
G2. Goodwin (1966)	Average andesite	
W2. Wilson *et al.* (1965)	Average andesite	
D2. Descarreaux (1972)		7DX 410
G3. Goodwin (1966)	Average dacite	
W3. Wilson *et al.* (1965)	Average dacite	
D3. Descarreaux (1972)		9DX 027
G4. Goodwin (1966)	Average rhyodacite	
W4. Wilson *et al.* (1965)	Average rhyodacite	
D4. Descarreaux (1972)		7DX 476
G5. Goodwin (1966)	Average rhyolite	
W5. Wilson *et al.* (1965)	Average rhyolite	
D5. Descarreaux (1972)		9DX 028
Metasediments		
1.	Slate and chert layers	A 212-1
2.	Sandstone or felsic tuff	A 212-3
3.	Slate and sandy layers	A 227-1
4.	Banded slate	A 228
5.	Metasediment (?)	A 2098
G6. Goodwin (1967)	Average greywacke (av. of 16)	

Table 10 – continued

Figure Number	Field Name	Field Number
Metagabbro/Metadiorite		
1.	Sheared metagabbro	A 378
D6. Descarreaux (1972)		8GJ 132
Metadiabase		
1.	Porphyritic diabase	A 370-2
2.	Porphyritic diabase	A 2007-2
3.	Diabase dike	A 69

The petrogenesis of the Tashota area rocks seems to have involved a contemporaneous extrusion and intrusion of magmas of contrasting compositions without, or with only negligible, intermediate members. This phenomenon has been demonstrated experimentally by Yoder (1973), and widely recognized in the field by Fenner (1938; 1944), Holmes (1931), Wilcox (1944), Hawkes (1945), Tsuya (1955), Chayes (1963) and others. The Tashota volcanic rocks probably represent a single initial magma whose eruptive centre (or centres) have not yet been defined by the present scale of mapping.

ECONOMIC GEOLOGY

There are no major past or present producing mines in the area, but test gold ore was shipped by: Tash-Orn Mines Limited (700 pounds) in 1917; by Wascanna Mines Limited (1,000 pounds) in 1917; and by George H. Adair ('Adair Prospect') (33 tons) in 1931. Extensive underground development was conducted by various companies and individuals on the M.U.Johnstone, and K.G. Cameron (8) Property.

Nearly all the exploration activity in the area has been confined to the host mafic metavolcanics, and the auriferous quartz veins cutting these rocks. The veins also contain minor silver, chalcopyrite, galena, sphalerite, and substantial disseminations of pyrite, pyrrhotite, magnetite, hematite, and graphite.

Most of the massive sulphide mining camps in Northern Ontario and other Precambrian areas of the world are spatially related to felsic calc-alkaline pyroclastic volcanic rocks, for instance: Kuroko-type deposit (Clark 1971; Tatsumi 1970); Coronation Mine, Saskatchewan (Froese 1969); Western Nuclear Mine, Saskatchewan (Coleman 1970); Ontario and other Canadian Mines (Sangster 1972).The felsic volcanic rocks in the Tashota area are coarse pyroclastics associated with oxide and sulphide iron formation, as well as a few iron and carbonate rocks, of the exhalite facies (Ridler 1973). As determined by fragment size and distribution (see Section on "Felsic Metavolcanics"), the felsic metavolcanics exhibit facies change towards the northeast-central part of the map-area, which indicates proximity to an eruptive centre in this direction. The map-area therefore is an attractive area for the search of massive sulphides.

In order to determine metalliferous associations in the area, 21 selected grab samples of mineralized rocks were collected and submitted for metal assays and metal spectrographic analyses that were conducted by the Mineral Research Branch, Ontario Division of Mines. Economic mineral occurrences of the area which have been sampled and investigated can be divided into seven categories as follows: 1) gold in quartz veins; 2) auriferous quartz veins containing copper-lead-zinc-silver; 3) copper in quartz monzonites; 4) massive pyrite-pyrrhotite deposits in schists with or without silver-gold-copper mineralization; 5) iron formation deposits; 6) gold/copper associated with iron formation; and 7) industrial mineral deposits. Brief descriptions of their mode of occurrence and possible genesis are presented, but a more detailed description of each property is given where applicable in the section "Description of Properties".

Gold

A great number of the gold occurrences in the Tashota camp occur almost exclusively associated with narrow veins, lenses, and pods of quartz which are mainly injected into sheared mafic metavolcanics and derived schists. Quartz-feldspar porphyry dikes are invariably close to mineralization, and are in many cases also sheared along with the enclosing greenstones. The gold occurs as a native mineral, and also is combined with pyrite. Gold is also concentrated within strongly orientated mafic metavolcanic zones that are cut by the porphyry dikes, and appears to have been formed at a post-metamorphic and late-tectonic stage.

The origin of the gold is unknown, but Gledhill (1925) has suggested a replacement-type origin accompanying the intrusion of feldspar-quartz porphyry dikes.

Copper, Zinc, Lead, and Silver

Some gold occurrences include other metal concentrations associated with gold mineralization. Visible chalcopyrite, galena, and sphalerite occur in the area, as for example in the following five grab samples (analyzed by the Mineral Research Branch, Ontario Division of Mines, collected by the field party from trenches, dump, and outcrops around the Adair shaft area (Table 11). Silver-bearing minerals were not recognized in the field, but silver assays as high as 80 ounces per ton (Gledhill 1925) were reported.

Copper

The Gzowski Lake Stock is peculiar because the stock: 1) appears to be a high level (miarolithic) intrusion forcefully emplaced at a shallow depth; 2) it has outcrops in which pink staining, believed to be the result of potash-metasomatism, is evident (Photo 12, in subsection "Gzowski Lake Stock") and; 3) it contains minor copper mineralization. Disseminated chalcopyrite is visible in an

outcrop at the tip of the southwestern shore of Gzowski Lake. The mineralization was visible only in one part of the outcrop which measures 76 m (250 feet) by 30 m (100 feet). In the area of mineralization, a pseudo-fragmental texture caused by pink stains believed to be potassium-rich zones weather white, whereas suspected potassium-poor units weather pink. This feature is accompanied by close-spaced jointing in pink units, and a notable permeation by quartz veinlets. Copper content of three analyzed grab samples taken by the author (analyzed by the Mineral Research Branch, Ontario Division of Mines, Toronto) was only in trace amounts, but these samples also returned 0.05 to 0.50 percent values of titanium oxide (TiO_2). The area may have porphyry copper economic possibilities (see also section on "Elbow Lake Stock").

TABLE 11 | ASSAYS FROM ADAIR PROSPECT.

	Percent Cu	Percent Pb	Percent Zn	Gold ounces per ton	Silver ounces per ton
Sample 1	0.12	0.10	Tr	0.07	Tr
Sample 2	0.05	1.60	Tr	2.41	2.34
Sample 3	0.17	4.65	0.19	5.86	3.60
Sample 4	0.45	3.18	0.18	14.86	6.84
Sample 5	0.05	0.03	Tr	0.01	Tr

Abbreviation
Tr - trace

TABLE 12 | ASSAYS OF MASSIVE PYRRHOTITE-PYRITE SAMPLES.

Sample	Location/ Property No.	Host Rock/ Origin	Gold oz/T	Silver oz/T	Copper %	Iron %
1	NW of Thumb Lake	Sericite Schist/ Felsic Fragmental	0.05	6.19	0.27	10.00
2	N of Thumb L.	Chlorite Schist/ Mafic Volcanic	0.05	1.57	0.21	5.85
3	S of Tracks, E of Redmond	Chlorite Schist/ Mafic Volcanic	0.01	Tr	0.01	31.90

Silver, Gold, and Copper

Massive pyrite-pyrrhotite deposits are widespread, and reach widths of several feet (60 cm). These deposits have been located by trenching, diamond drilling and geophysical surveys, and are predominantly found in schist in the mafic and felsic metavolcanics. Three selected grab samples of massive pyrite-pyrrhotite which were collected by the author and analyzed by the Mineral Research Branch, Ontario Division of Mines, gave results shown in Table 12.

These sulphide bodies occur in sheared rocks and appear to be tectonically controlled, but their origin is not well-understood at this time. They occur exclusively within the metavolcanics.

Iron

The western limit of the Onaman Iron Ranges, as described by Moore (1909), lies in the Tashota area. The iron formation in the area, as outlined by diamond drilling and magnetic surveys, does not appear to attain the same widths as in other parts of the Onaman Iron Ranges. Like the better known section (Moore 1909), the Tashota area iron formation contains much banded jasper and magnetite (with associated pyrite-pyrrhotite) which in itself is rich enough in iron to be profitable, but, the banded magnetite and jasper is usually interbedded with much volcanic schist and slate, and so far diamond drilling and surface examination have failed to outline economic concentrations of iron ore.

Gold, and Copper associated with Iron Formation

Trace to moderate amounts of gold and minor copper values were obtained from iron formation in the following properties: M.U. Johnstone and K.G. Cameron (8), Lake Ste. Marie Occurrence, Paulpic Gold Mines Limited (15), and the Cline Prospect (see section on "Paulpic Gold Mines Limited (15)"). The mineralized material of this type of deposit is fine-grained sugary quartz with bands of magnetite mineralized predominantly with pyrrhotite and some chalcopyrite. The iron formation is invariably cut by a network of quartz stringers.

Industrial Mineral Deposits

A few sand and gravel pits are found along the old logging roads in the northwestern part of the map-area. In addition, a large abandoned quarry, which was once serviced by a rail siding, is located about 1.6 km (1 mile) southeast of the old Tashota station. These deposits could be utilized for road and building construction.

Description of Properties

Occurrences, and Prospects

This section describes exploration work conducted on properties, occurrences, and prospects, that are filed in the Regional Geologist's Files, Ontario Ministry of Natural Resources, Thunder Bay and in the Assessment Files Research Office, Ontario Ministry of Natural Resources, Toronto. Table 13 lists current owners, and Table 14 summarizes the assessment information alphabetically.

A definition of the terms as used in this report and Ontario Division of Mines publications is outlined below:

A 'property' is a claim group or parcel of land held as of December 31 following completion of the field mapping. Each property is listed alphabetically by the name of the company or individual holding it. Previous owners are listed separately in Table 13, but are described under current owners. An 'occurrence' is a mineral deposit which has been tested by less than 600 m (2,000 feet) of diamond drilling, and which has no underground lateral development. A 'prospect' is a mineral deposit on which significant exploration and/or development work has been performed. The term 'deposit' is alternatively used as a substitute for 'mine', 'prospect', or 'occurrence'.

Parcels of land upon which significant exploration work has been conducted, but no mineral deposits discovered, and which are open for staking, are described under the heading of the name of the company or individual who last performed exploration work, and the date in brackets after the name is the date of the last major work done.

The numbers in parentheses following each property description heading refer to property location numbers on Map 2354, back pocket.

H.P. BRIGHTMAN (1)[1]

This property is leased up to November 30, 1993, and consists of six claims (KK2683, KK2639, KK2667, KK2668, KK2672, and KK2694) totalling 118.9 ha (297.35 acres). It is located approximately 2.4 km (1½ miles) southeast of Tashota Station, and is close to the old Tash-Orn prospect (Wascanna Prospect).

History

Robert Wells discovered a 152 cm (5-foot) wide vein containing considerable native gold on claim TB2892 (Not TB350692) in 1916 (Hopkins 1917, p.218; Kindle 1931, p.96). His property was sold to Tash-Orn Mines Limited for $25,000.00 (Hopkins 1917).

[1]Number refers to property number on Map 2354, back pocket.

TABLE 13 | LIST OF CURRENT OWNERS IN THE TASHOTA AREA.

OWNER		FORMER WORK ON PROSPECT/OCCURRENCE
1. Brightman, Harry P.	-"L"	- Cashaback *et al.* [1972] - R. Wells Occurrence - Tash-Orn Prospect - Wascanna Mine Prospect
2. Cosman, Harry A.		
3. Croteau, J.F.M.		- Kipper-Tashota Prospect
4. Cummer, William J.		- Adair Occurrence - Tashota Creek Prospect - Invaday Mining and Exploration Co. Ltd. [1936] - Rowan "990" claims [1961] - Knapp Claims [1961] - Vincent Feeley [1965] - L.G. Phelan, R.F. Liard (Projex, Ltd.) [1973] - Cashaback *et al.* [1972]
5. Cuzzola, Frank	-"P"	
6. Ellard, Kenneth		
7. Hopkins, Albert P.	-"P"	
8. Johnstone, Mildred U. & Cameron, Kenneth G.	-"L"	- Edgelake Gold Mining Prospect - Tash-Orn Prospect (Wascanna Mine Prospect)
9. Low, Dennis		
10. MacMorine, A.B.	-"P"	- Hendrickson Occurrence - Pardners Prospect
11. McPhail, Duncan M. *et al.*	-"L"	
12. Middaugh, Richard		
13. Noffke, Richard J.	-"P"	- Kipper-Cameron Gold Prospect Candela Development Prospect - Lake Ste. Marie I.F. Prospect - Pardners Prospect
14. Noranda Exploration Co. Ltd.		
15. Paulpic Gold Mines Ltd.	-"L"	- Cline Prospect - Tom Johnson Nipigon Mines Limited [1936]
16. Picotte, Julien J.	-"L"	
17. Schmitt, Harry		
19. West, James W. & West, Lewis, H.	-"L"	
20. Yzerdraat, Walter		

"L" - Lease
"P" - Patent

In June 1917, Tash-Orn Mines Limited sank a shaft to a depth of 36.6 m (120 feet) and was expected to reach the 60 m (200-foot) level (Kindle 1931, p.96) by July that year, but the mine was apparently abandoned. During underground development in 1917, 700 pounds of test gold ore from a 9 to 11 m (30 to 35-foot) depth was shipped. At a depth of 28 m (92 feet) drifts were run to the north to intersect the numerous parallel mineralized veins, and to the southwest following the irregularly striking mineralized lenses (Hopkins 1917). Some crosscuts were also established.

Wascanna Mines Limited was incorporated in 1936. The property it held at that time consisted of 13 claims, including all of the six claims now leased by

TABLE 14 | SUMMARY OF ASSESSMENT RECORDS FOR TASHOTA AREA, AS FILED WITH ONTARIO DIVISION OF MINES UP TO DECEMBER 31, 1973.

Company/Individual	Survey/Work	Year	DDH Footage	Commodity	File No. (Office)	Area (Twp.)
Adair, Geo. H.	Shaft, ud, Mech	1920s		Au		Metc LA
Candela Development Co. Ltd.	ddh	1953	874	UK	10	Obosh
Cashaback, *et al.*	GEM, GMAG	1972		UK	2,922 (TO)	Metc LA
Cline Prospect	shaft, mech	1917	165	Au	P	Metc LA
Cummer, William J.	ddh					
Cummer, William J.	GEM, GMAG	1973		G	-	Metc LA
Edgelake Gold Mines, Ltd.	Geol, Mech, Shaft UD	1934		Au	TB	Gzowk
Hendrickson Prospect	ddh, Mech, Geol	1916	2,147.5	Au, Zn	63.111	Obosh LA
Invaday Mining & Expl. Ltd.	ddh, UD	1948		Au		Metc LA
Kennco Expl.	ABMAG, ABEM	1959		G	63:2900	Gz, Metc Obosh
Kipper-Cameron Prospect	ddh, Mech	1942		Au	P	Obosh
Kipper-Tashota Prospect	shaft, Mech	1916	1,004 ft.	Au	P	Metc LA
	Geol, ddh	1923				
Knapp Claims	ddh, shaft	1961	334	UK	8.3.122	Metc LA
Noffke, Richard J.	(see Kipper-Cameron Prospect)			G	P	Obosh
Pardner Mines	Geol, GMAG, ddh	1948	278	G	63A7	Metc LA
Phelps Dodge Corp.	ABEM, ABMAG ddh	1970	186	G	10	Metc & Obosh
Rowan "990" Claims [1961]	ddh	1961	549	Au	8.3.123	Metc LA
Tashota Creek GM Prospect	Mech	1935		Au		Metc LA
Tash-Orn Prospect	(see Wascanna Mines Limited)			Au		Metc LA
Tom Johnson Nipigon Mines Limited	Mech, ddh	1937	10,000	G	TB	Metc LA
Vincent, Feeley	GEM, SP	1966		G	63.1821	Metc LA
Wascanna Mines Ltd.	Mech, Geol	1936	2,019	Au	P, TB	Metc LA
	shaft, UD		1,618			
R. Wells, Occurrence	(see Wascanna Mines Limited)			Au	TB	?Metc LA

UK - Unknown G - General P - Private UD - Underground Development GEM - Ground Electromagnetic Survey GMAG - Ground Magnetic Survey ABEM - Airborne Electromagnetic Survey ABMAG - Airborne Magnetic Survey Mech - Mechanical Survey DDH - Diamond Drill Hole SP - Self potential survey Au - Gold

Metc LA - Metcalfe Lake Area Obosh - Oboshkegan Township
Gzowk - Gzowski Township Gz - Gzowski Township
To metricate multiply footage by 0.3048

Brightman and Cashaback-Dean, totalling approximately 240 ha (600 acres). It included claim TB2892 (now TB350692), the old Tash-Orn Mine, and comprised the following claims: KK2667 to KK2672, KK2638 to KK2639, KK2694 to KK2696 all inclusive, KK385, and TB 2892. In 1936, according to Sinclair *et al.* (1937) a two-compartment, vertical shaft was sunk to a depth of 46.3 m (152 feet), and approximately 120 m (400 feet) of lateral work was completed at the 30 m (100-foot) level. During the sinking of the shaft, a test shipment was made up of 450 Kg (1,000 pounds) of ore, reported to have run approximately 1.12 ounces per ton of gold. After spending approximately $140,000.00, the company operators ran out of funds, and the mine was closed down and remained idle until the Fort Rouille Mining Corporation Limited secured the property, early in 1936. Sinclair *et al.* (1937) reported that in June 1936, this company drained the shaft, and at the beginning of October 1936 began construction of buildings, and installation of a mining plant was begun. The mining plant included a Bellis and Morcome 750-cubic foot compressor, driven by a 175 h.p. Ruston-Hounsby Diesel engine, and an 18 by 25 cm (7 by 10 inch) singledrum, reversible hoist. Surface buildings then included: a shaft-house, a power-house, a dry-house, a bunkhouse, a cookery, an office, and one residence. Late in 1936, 24 men were employed (Sinclair *et al.* 1937) and a geophysical survey was made by Hans Lundberg of some of the claims (Moorhouse 1938), but no details or results are available. By the end of 1936, surface work conducted in parts of the property included systematic sampling of a highly sheared, contorted and silicified zone on claim KK2667. A 1.8 m (6 feet) wide gossan zone of silicified iron formation on claim KK2668 was also tested, but with no significant results being realized. The underground development was continued in 1937. The installation of the mining plant was completed, and the two-compartment vertical shaft was sunk an additional 50 m (170 feet) to a total depth of 98.1 m (322 feet). Levels were established at 60 and 90 m (200, and 300 feet) depths and a total of 433.1 m (1,421 feet) of drifting and cross cutting was accomplished. In addition to the underground development a total of 615.4 m (2,019 feet) of diamond drilling was done from the surface, and 493.2 m (1,618 feet) from underground workings. A total of 25 men were employed under P.W. Meahan, then Mine Manager. The operations were suspended in October 1937, and no underground work was done during 1938. Surface operations were confined to the drilling of nine diamond-drill holes, with a total of 949.8 m (3,116 feet). No reports are available about Wascanna operations between 1939 and 1956. The property was leased by Wascanna Mines Limited between 1941 to 1942 for ten years, but was probably abandoned, because the company forfeited its lease when it expired, and the company charter was cancelled in 1957.

General Geology

The geology of this property was reported by Hopkins (1917), Kindle (1931), and Moorhouse (1938). The author and his assistants were unable to locate either outcrops or the old workings and shaft. Moorhouse (1938, p.25), stated that:

The country rock at the Wascanna [mine area] is largely Keewatin greenstone, including much ellipsoidal lava and pillow lava schists.

The general strike, the regional trend of the schistosity of these rocks is N30°E according to Hopkins (1917, p.218), and north-south according to Moorhouse (1938, p.25). Moorhouse (1938, p.25) also reported that:

In the Keewatin ['greenstone'] there also occurs iron formation in considerable amount, as well as banded cherty silica. These rocks have been rather extensively intruded by narrow, medium- to fine-grained, sometimes highly sheared, siliceous quartz-feldspar porphyry [dikes].

This essentially corroborates information from Hopkins (1917) and Kindle (1931). Lamprophyre dikes and local carbonate alteration zones were also intersected underground (see Moorhouse 1938).

Economic Geology

The original Tash-Orn shaft was sunk to a depth of 43.3 m (142 feet), (Moorhouse 1938), and was collared on a lens of quartz several feet in width and carrying visible gold (Hopkins 1917). This lens of quartz narrows northward and eventually branches into parallel, thin stringers (Hopkins 1917, p.220; Moorhouse 1938, p.28). To the southwest of the shaft, the lens of quartz tapers for about 27 m (90 feet) and terminates at two pre-ore intersecting and partly mineralized faults (Hopkins 1917; Moorhouse 1938). The host quartz vein exposed in the underground workings was auriferous to a depth of 30 m (100 feet) where the vein displayed a brecciated texture (Hopkins 1917). During underground development in 1917, 700 pounds of test gold ore valued at $20.00 per ton, was shipped (Hopkins 1917); the price of gold in 1917, was about $20.67 per ounce. The ore body on the first level was reported by Hopkins (1917), and Kindle (1931, p.97) to be better developed in strike length and width than that observed on the surface, and averaged $5.00 to the ton (1917 prices). According to Hopkins (1917, p.220):

...the gold generally occurring along the dark fractures, which are filled with crushed quartz, calcite, talc, chlorite, and pyrite. Some native copper is present in the vein at the surface, while chalcopyrite, pyrrhotite, tourmaline, and sericite occur in varying quantities. The deposit has been enlarged by the replacement of the country rock. The mineralized schists adjoining the veins and between the lenses sometimes carry gold values, but often they do not contain any gold.

When the shaft was deepened to a total depth of 98.1 m (322 feet) by Wascanna operators in 1937, the geology, mineralogy, and structure of the orebody and the surrounding country rocks showed little change, but it was noted by Moorhouse (1938, p.25) that:

The faults bear a close relationship to the ore; the greatest widths of quartz and the best values occur near them, and both values and widths of the stringers to the north of the lens decrease away from the faults. Thus the main lens may be as wide as 15 feet [4.6 m] near the fault, but it peters out to 5 feet [1.5 m] of narrow stringers, 1-5 inches [2.5-12.7 cm] wide.

Moorhouse (1938, p.25) stated that:

...on the first level, a zone 120 feet [366 m] long averaged 0.36 ounces [per ton gold] over an average width of 7.5 feet [2.3 m]. On the 200- and 300-foot [60 and 90 m] levels, however, the values are reported to be very erratic. Widths and values on these levels apparently decrease rapidly away from the faults.

During the deepening of the shaft in 1936-37, a test shipment was made of 1,000 pounds of ore from the 30 m (100-foot) level, and was reported to have run 1.12 ounces per ton of gold (Sinclair *et al.* 1937, p.215 to 216; 1938, p.223 to 224). Assay results from surface work on claim KK2667 returned mostly trace amounts of gold, but Moorhouse (1938, p.25) reported that two samples assayed 0.19 and 0.25 ounce per ton in gold. No exploration work is reported by the current owner, H.P. Brightman.

H.A. COSMAN (2)

In 1973, Harry A. Cosman restaked two formerly leased claims KK2994, KK2995 situated east of Mile 11 in Gzowski Township.

J.F.M. CROTEAU (3)

J.F.M. Croteau owns the following claims: TB352207, TB352208, TB337072 to TB337075 inclusive. These claims were originally KK89, KK90 (PA39029), KK91, KK92 (PA 39032), KK93 and KK144, and are surveyed claims which formerly comprised part of the "Kipper Tashota Prospect".

The "Kipper Tashota Prospect" originally comprised six surveyed mining claims numbered KK89 to KK93 inclusive, and KK144, six unsurveyed claims numbered KK1562 to KK1564 and KK1479 to KK1481, all inclusive, and contained approximately 200 ha (500 acres). This group of claims is located 1.6 km (one mile) north of the Canadian National Railway tracks, and 4.8 km (3 miles) east of Tashota Station.

History

Gold was discovered on Vein No. 1 on the Hull claim (KK92) late in November 1916 (Hopkins 1917). During that winter, an inclined shaft was sunk on the vein to a vertical depth of 15 m (50 feet). The following summer, stripping, test-pitting, and detailed sampling were conducted on this and the adjoining claims (KK93, KK90). Other gold-bearing veins Number 2 (KK93) and Number 3 (KK90) were subsequently found, and these were investigated by surface exploration which included prospect shafts or test pits (Hopkins 1945, personal private files). The property was then optioned by Coniagas Mines Limited who, in 1923, drilled two diamond-drill holes totalling 301.2 m (1,004 feet) with no encouraging

results (Hopkins 1945, personal private files). Coniagas Mines Limited then reportedly dropped the property. The past owners, Messrs. Kipper, Hull, Rivett, and Goad discovered more veins, Numbers 4, 5 and 6 upon continued prospecting. A new company (Kipper Tashota Gold Mines Limited) was formed in 1928 to control the ground. This company was chartered in Ontario and renamed Lincoln Gold Mines Limited in 1936 (Hopkins 1945, personal private files). Despite considerable development that the company undertook, Lincoln Gold Mines Limited did not make the property into a mine. The ground apparently remained in good standing until 1973 when it was restaked by J.F.M. Croteau.

General Geology

The geology of the property consists of northwest-striking Early Precambrian mafic metavolcanic schist flanking the east side of the "Tashota Iron Formation", and wedged between the Gzowski and Elbow Lake Stocks. Into this 'greenstone belt' were intruded porphyry dikes and younger diabase dikes. All rocks were injected by auriferous, post-metamorphic, late-tectonic quartz veins.

Economic Geology

Like most of the other properties in this camp, the favourable areas for the occurrence of gold are probably sections of the mafic lava schist where porphyry dikes were intruded. These areas are invariably brecciated and injected with quartz lenses, stringers, and veins of irregular shape (Hopkins 1917, Gledhill 1925, Kindle 1931 and Amukun 1973).

According to Hopkins (1928, personal private files):

> The veins which are very irregular in shape appear to follow, more or less, the tuffs and brecciated zones associated with the pillow lavas and frequently near the porphyry intrusions. At one place on Claim KK90 the quartz lens is [over]60 feet [18.3 m] across, usually the deposits consist of numerous closely-spaced parallel quartz veinlets up to one and two inches in width in green schists. Very few veins were seen in the porphyry.
>
> Pyrite, the chief sulphide is abundant in portions of some of the veins and rare in others. In certain surface sections which are well-mineralized low values of gold can be obtained over wide widths. In other sections and in certain other veins the quartz is glassy and does not look attractive (to mineral exploitation). Two small well-mineralized and contorted lenses on claims KK92 and 90 gave $19.60 and $20.00 gold per ton both over (widths of) 42 inches [106.7 cm] (1928 price of gold was $20.67/ton) but in both cases no appreciable lengths have as yet been exposed.
>
> There are also a few narrow ankerite veins from 3 to 5 feet [0.9 to 1.5 m] wide which contain a little vein quartz and reported to carry gold on panning; these are too small to be (of) economic (potential).

A total of six major veins were tested according to Assessment Files Research Library, Ontario Division of Mines, Toronto (see Table 15).

The gangue minerals in the property reported by Hopkins (1945, personal private files) include quartz, ankerite, chlorite, sericite, hornblende, and tourmaline. Hopkins (1945, personal private files) also reported that:

TABLE 15 | ASSAYS OF VEINS FROM KIPPER-TASHOTA PROSPECT.

Vein No.	Location (Claim No.)	Width (Average)	Type of Test	Mineralogy	Gold Values
1.	Claim KK92	Up to 75 ft. (23 m)	Shaft, chip & channel sampling, Pits	I.F.(siderite, magnetite, pyrite)	Low
	Claim KK92	42 inches (106.7 cm)	same	pyrite	$19.60/ ton
2.	Claim KK93	Unknown	Pits (No.4) channel	pyrite	Low
3.	Claim KK90	up to 50 ft. (15 m)	chip & channel sampling, Trench Pits 2 DDH @ 1,004 ft.(3,060 m)	pyrite	Low
4.	Claim KK89	up to 50 ft. (15 m)	Moss-stripping 10 pits	pyrite gold	None
5.	Claim KK91	8-10 ft. (2.4-3 m) (700 ft. long) (210 m)	Pits	dolomite pyrite	Low
6.	Claim KK92-93 Near No. 2	16 ft. (4.9 m)	Pits Channel	pyrite	Low

Sulphides occur sparingly in the quartz, but are more common in the schist. Ore minerals include pyrite, pyrrhotite, chalcopyrite, native gold and copper.

The gold values from samples taken by P.E. Hopkins, Bartlett, J. Dixon, P.J. Murphy, J. Redinton, and A.P. Hopkins averaged less than $5.00 per ton gold (1945 price of $38.50) over narrow widths, but a few returned assay values of over $10.00 per ton gold (Hopkins 1945, personal private files).

A scheelite vein was also sampled by E.S. MacCarthy in 1948 (Hopkins 1945, personal private files) on Claim KK93 east of the shaft. Tungsten values reported by Hopkins were apparently too low for development, ranging in value from trace amounts to 0.24 oz/ton tungsten over narrow widths. Three samples assayed 0.47, 0.53 and 0.90 oz per ton tungsten over 71, 56, and 76 cm (28-, 22- and 30-inch) widths respectively.

W.J. CUMMER (4)

On July 30, 1973, ground held by L.G. Phelan and R.F. Liard, as well as the old Adair and Knapp Prospects was transferred to W.J. Cummer who held the property "in trust" on behalf of New Fenimore Iron Mines Limited. During the 1973 field season, and at the request of New Fenimore Iron Mines Limited, Derry, Michener, and Booth Limited surveyed part of the property made up of a 20-claim group that covered an area of 320 ha (800 acres). The surveys were all carried out on a grid formed of a north-south baseline and picketed east-west winglines, and included: geological mapping, a magnetic survey, and mechanical work (trenching and blasting). The results of the magnetic survey were reported to be inconclusive, and the mechanical work only outlined areas of erratic gold values (Assessment Files Research Office, Ontario Division of Mines, Toronto). However, the geological mapping successfully defined the Elbow Lake Stock–mafic metavolcanic contact in the northwest portion of the property.

History

'ADAIR PROSPECT'

George H. Adair made a gold discovery along Tashota Creek approximately 3.2 km (2 miles) south of the Canadian National Railway station at Tashota in October 1924 (Gledhill 1925). His property consisted of six claims including KK986, KK989, KK990, KK996. Considerable surface work was done on the property including channel sampling, grab and chip sampling, and trenching. A 7.9 m (27-foot) vertical shaft was sunk on a "high-grade" quartz vein on claim KK990. A shipment of 34 tons of ore from this shaft returned 0.442 ounce of gold per ton, or approximately $15.47 per ton (at $35.00 per ounce) and minor silver (Rogers and Young 1932, p.9). By 1929-1930, the shaft had been deepened to a depth of 20 m (70 feet) (Kindle 1931, p.94). Tashota Creek Gold Mines Limited (Incorporated in 1934) controlled the Adair property in 1934 (Halstead 1947, in Regional Geologist's Files, Ontario Ministry of Natural Resources, Thunder Bay). However, this company became bankrupt after completion of stripping, sampling, road cutting, and erection of buildings (Halstead 1947 Regional Geologist's Files, Ontario Ministry of Natural Resources, Thunder Bay). Its charter was cancelled in 1937. In 1944, Invaday Mining and Exploration Limited was incorporated. This company owned and controlled a group of ten contiguous claims including the six Adair claims. Invaday Mining and Exploration Limited continued to conduct surface working and apparently tried to option the ground to Sylvanite Gold Mines, Limited, in 1948 (Assessment Files Research Office, Ontario Division of Mines, Toronto). No agreements were apparently negotiated and the company's charter was cancelled in 1962. In 1961, the six Adair claims were known as the Rowan "990" claim group. Four diamond-drill holes (Tr, 3, 5, 7 and 8) totalling 167.3 m (549 feet) were drilled by the holders; gold inter-

est was renewed, but with no encouraging results. By 1965, the Adair property was included in the property of V. Feeley which consisted of 12 unpatented, contiguous mining claims. A self-potential survey as well as a ground magnetometer survey was conducted by V. Feeley and D. Seppa over the 12 claims in 1965. Several anomalies were located by the survey, and three of these were proposed to be tested by shallow diamond-drill holes. The proposal was apparently not followed up because the anomalies were considered to be located in areas of uninteresting geology (Assessment Files Research Office, Ontario Division of Mines, Toronto). Before the ground was acquired by William J. Cummer on July 30, 1973 it was held by L.G. Phelan and R.F. Liard of Projex Limited.

'KNAPP PROSPECT'

The Knapp claims consisted of two unpatented claims, KK21214 and KK21224, located southeast of the 'Adair Prospect' (Map 2354, back pocket).

A record of three diamond-drill holes totalling 101.8 m (334 feet) were drilled in 1961 apparently without any encouraging results is in File 83122, Assessment Files Research Office, Ontario Division of Mines, Toronto, and also is available from the Regional Geologist's Files, Ontario Ministry of Natural Resources, Thunder Bay.

In 1961, three diamond-drill holes numbered K4, K5 and K6, all on claim KK21224, were drilled by an unrecorded person or persons, and the core was logged by Dr. R.V. Oja of Thunder Bay (Regional Geologist's Files, Ontario Ministry of Natural Resources, Thunder Bay). The core intersections of sulphide minerals were restricted to pyrrhotite and pyrite, with apparently no valuable metal indications.

No record of the person(s) responsible for the sinking of an old shaft on the property is available, but the ground was included in the block that William J. Cummer (4), has acquired.

'CASHABACK AND DEAN CLAIMS'

In 1972, Mrs. Maybelle Cashaback and Mr. J. Richard Dean jointly owned a group of 20 adjoining non-patented claims located approximately 3.2 km (2 miles) southwest of Tashota station and 2.3 km (3/4 mile) east of South Ridge Lake. The claims included the former Wascanna mine shaft former claim TB350692. A geophysical (magnetic) survey was conducted over the whole group of claims in 1972 using a grid cut with east-running wing lines set at 120 m (400-foot) intervals across two staggered N-S baselines. Numerous anomalous magnetic areas were outlined by the survey. The first zone, located on the west side of the claim group, is very strong ranging in intensity from 14,000 to 100,000 gammas. The first zone trends approximately N10°E, and extends (with a break between L4N-L20N) from Line 44N, 2E to Line 28S, 31W. This zone coincides with the location of the iron formation defined by airborne magnetic survey data of Elbow Lake Stock (ODM-GSC 1963a). Dean (1972, in Regional Geologist's

Files, Ontario Ministry of Natural Resources, Thunder Bay) estimated the width of this feature to range from 6 to 45 m (20 to 150 feet), and the depth from 1.5 to 9 m (5 to 30 feet) within locations on Line 24N, 9W, and Line 4S, 19W respectively. The rest of the magnetic localities are east of the northern baseline. These zones are discontinuous, characterized by a lower magnetic intensity, and are probably caused by disseminated pyrrhotite, pyrite, and/or graphite. An electromagnetic survey was also conducted over only 14 claims of the property on the grid that was used for the magnetic survey. The instruments and method of procedure used in this survey are not described, but several moderate to poorly defined conductive zones were outlined. Those with an accompanying magnetic correlation are located on Line 28S, 22W to Line 4S, 17W; Lines 20N, 24N, 28N, 32N; and Line 4N, 18W, and can be related to iron formation. Others, probably caused by disseminated sulphide minerals are located on Line 52S, 23W; Line 16S/19W, Line 32S/20W. No encouraging results were apparently obtained, and the claim group was transferred to L.G. Phelan and R.F. Liard (Projex Limited) on the 6th September 1972. No record of work performed by Phelan and Liard is available.

General Geology

The geology of the property was previously reported by Gledhill (1925) and Kindle (1931). Also in the Regional Geologist's Files, Ontario Ministry of Natural Resources, Thunder Bay, the following geological accounts are available: Halstead (1935); Leslie (1937); and Derry, Michener, and Booth (1973). The mineralized quartz veins of the area are injected into highly sheared mafic to intermediate metavolcanics (and derived chlorite schist) which are extensively intruded by swarms of narrow quartz and/or feldspar porphyry dikes and derived quartz sericite schist. The rocks in the vicinity of the shaft consist of pillow lava, chlorite schist, quartz-sericite schist, porphyry dikes, and gabbro, all with a foliation of N25°E, and a dip of 75 to 85°E. At the western end of the property is an intrusive contact between the metavolcanics and derived schists, and the Elbow Lake Stock. The geology of the property mapped by the field party from traverses along grid lines is shown in Figure 13 at a scale of 1 inch to 400 feet (1:4,800). The geology of the area around the Knapp claims is similar to that around the Adair ground, except that there are fewer felsic dikes and derived schists.

Economic Geology

At the Adair property, gold occurrences are almost exclusively associated with narrow veins of quartz predominantly within sheared mafic metavolcanics and derived schist. Sheared quartz and/or feldspar porphyry dikes and derived quartz-sericite schist are invariably intruded into the mafic metavolcanics in the vicinity of the mineralization. The metallic minerals associated with the gold in the veins and identified in the field are: pyrite, pyrrhotite, chalcopyrite, galena, and sphalerite. The presence of silver was detected only from assay results of se-

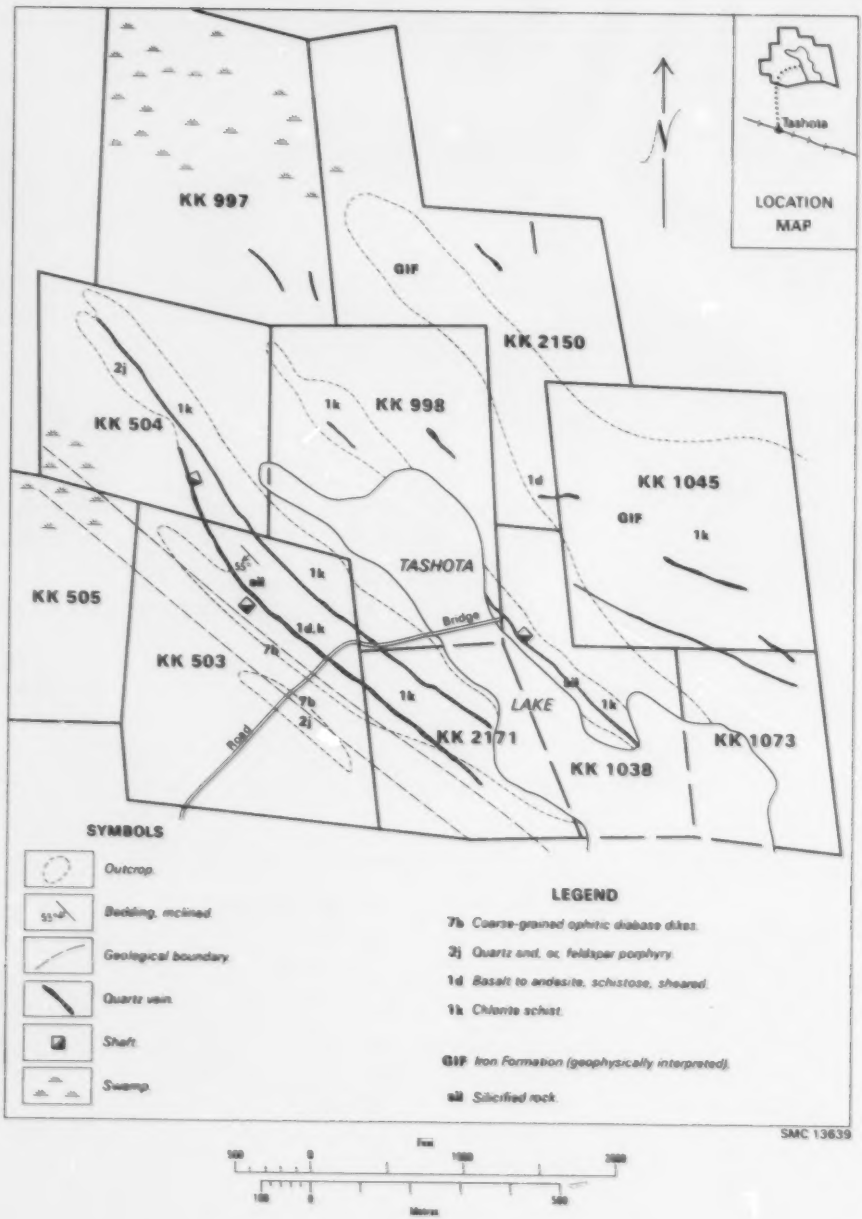

Figure 13–General geology about the Adair Shaft.

lected grab samples collected by the field party from the Adair shaft area and analyzed by the Mineral Research Branch, Ontario Division of Mines.

When the shaft was sunk in 1925, it exposed a vein of quartz 0.6 m (2 feet) wide extending downward for 1.5 m (5 feet), and carrying over an ounce in gold, and also a quartz vein about 0.9 m (3 feet) wide, widening out to 1.2 m (4 feet) at the 7.6 m (25-foot) level; also, channel assay results gave over 9 ounces per ton gold (Halstead 1947, in Regional Geologist's Files, Ontario Ministry of Natural Resources, Thunder Bay) and some silver. Other grab and chip sample results from the surface and underground workings returned encouraging values of gold and silver.

The mineralization in the Knapp claims consists of quartz veins in sheared metavolcanic schist containing pyrite, pyrrhotite and minor gold, molybdenite, and bismuthinite.

F. CUZZOLA (5)

Frank Cuzzola owns ten patented claims located around Hull and Devanney Lakes. Claims KK3072-KK3175 all inclusive total 70.4 ha (174.31 acres), and are located north-northwest of Knucklethumb Lake and east-southeast of Hull Lake. Claims KK3078-KK3079 (inclusive), KK3126-KK3129 (inclusive), and KK3162 all total 114.8 ha (284.08 acres), and are located north of the Canadian National Railway tracks, northeast of Devanney Lake south of the 'Kipper-Tashota Prospect'. The patent for the whole claim group was granted to Cuzzola Gold Mines Limited in September-October 1948. No record of work performed on the Cuzzola property is available. Lincoln Gold Mines Limited (formerly Kipper-Tashota Prospect) apparently attempted to obtain an option on this ground in 1945 without success.

K. ELLARD (6)

Kenneth Ellard Estate owns a total of 29 non-patented claims adjoining Noranda ground (14) around Oboshkegan and Slate Lakes. These claims are numbered TB329842-TB329858, TB329862-TB329864 and TB348985-TB348993, all inclusive. Claims TB348985-TB348998 were staked to reclaim patented claims KK3164-KK3172. The ground is located astride a magnetic depression on the nose of a fold within volcaniclastic sedimentary rocks.

A.P. HOPKINS (7)

The 7 patented claims KK3131, KK3132, KK3159, KK3163, KK3280, KK3281, and KK3283 (total 339.70 acres), now held by Albert P. Hopkins, were originally staked by his father Percy E. Hopkins in an attempt to procure the interpretated on-strike extension of the Kipper–Tashota Prospect. The property is

situated just north of the Canadian National Railway tracks, 3 miles (4.8 km) east of Tashota station. No record of work conducted on the ground is available, but extensive trenching and pitting were apparently done, and were located in the field.

M.U. JOHNSTONE AND K.G. CAMERON (8)

History

The Edgelake Gold Mining Company was incorporated in September 21, 1934 (with P.B. Cameron, president) to acquire interest on the following ten leased claims: KK503-505 (inclusive), KK997-KK998 (inclusive), KK1038, KK1045, KK1073, KK2150, and KK2171, all comprising about 161.6 ha (400 acres), and located about 2.4 km (1½ miles) north of Tashota Station, on the western shore of Tashota Lake.

M.U. Johnstone and K.G. Cameron acquired the property covering the 'Edgelake Prospect' through the wills of B. Cameron and A. Kipper in 1938. Johnstone and Cameron also pay taxes for claim KK2385 adjoining the Wascanna shaft (see Wascanna Prospect 18). Included is ground covered by claims KK998, 1038 and 1041 which was first described by Kindle (1931, p.93-94):

Cameron and Picotté

The claims (K.K.998, 1,038, 1,041) of P.B. Cameron and J.A. Picotté border on the north shore of Tashota lake about a mile [1.6 km] north of Tashota. A tractor road is used for transportation. Mr. Cameron has bored one diamond-drill hole 16 feet [4.9 m] deep to test a carbonate rock that outcrops close to his Tash-Orn pit. Otherwise exploration has been confined to pits sunk on quartz veins and rusty zones in the greenstone.

Mining on a narrow high-grade vein at pit No. 1 is planned for the winter months of 1930-31. A 30- to 40-mesh steam stamp mill with a capacity of 14 tons in 24 hours has been installed to treat this ore.

The country rock in the Tashota lake basin is Keewatin greenstone, which trends northwest-southeast. A number of outcrops of iron formation appear east of the lake. More than a dozen veins have been uncovered in the lake basin. The veins, which are wide and well mineralized, fill strongly sheared and schisted zones in the greenstone.

A number of porphyry dikes intrude the greenstone at pit No. 1; they have all been severely altered in the process of shearing. The rock succession across the strike at pit No. 1, starting at the shore, is as follows: quartz porphyry, 40 feet [12 m]; greenstone, 3 feet [0.9 m]; biotite lamprophyre, 2 feet [0.6 m]; quartz porphyry, 5 feet [1.5 m]; lamprophyre, 8 feet [2.4 m]; greenstone and rusty pyrrhotite, 2 feet [0.6 m]; lamprophyre, 1 foot [0.3 m]; brown-weathering, highly sheared quartz porphyry, 30 feet [9 m]. The 'bornite pit' is sunk in the last-named porphyry on a quartz vein 15 inches [38 cm] wide.

The strike of the vein at No. 1 pit is 160 degrees, and the local dip is 85°N. Vertical faulting is plainly evident. Vertical slickensiding indicates steep faulting along the vein in quartz porphyry. Polished sections of the ore from this pit show that the minerals fill irregular fractures in quartz. Remnant grains of pyrite have been replaced by sphalerite and chalcopyrite. Pyrrhotite was seen in siliceous gangue. The mineral bournonite was identified by M. Haycock in contact with chalcopyrite, sphalerite, and galena, but no age relationships could be determined.

Assays of a selected sample from the bornite pit gave: gold, none; silver, 4 ounces; zinc, 6 percent.

The carbonate rock 12 feet [3.6 m] northeast of the Tash-Orn pit is about 18 feet [6 m] wide and lies against a volcanic breccia and rhyolite. The carbonate appears to owe its origin to replacement.

The rock is white, being fully 80 per cent calcite, and is marked with numerous closely spaced pale-green bands, consisting of pyroxene, epidote and zoisite. Traces of zinc blende occur throughout the mass, shown in the photograph on page 67 [Kindle's report].

Molybdenite occurs in a quarry vein close to calcite veins exposed in the pit on claim K.K.1,062 about 300 feet [90 m] south of the claim. Small amounts of arsenopyrite occur in the vein on the island in line with the vein at No. 1 pit of the Cameron-Picotté property.

By December, 1934, two shafts had been sunk to depths of 5.5 m (18 feet) and 9.7 m (32 feet), and a great deal of trenching and test-pitting had been done on the 16 gold-bearing quartz veins (Sinclair *et al.* 1936).

During 1935, with an average of two men per month over a nine month period, the following construction work was done:

1) A 10.2 m (34-foot) high headframe was installed over a shaft sunk at an earlier date to a depth of 9.7 m (32 feet).

2) A boiler and hoist room building measuring 9 m by 9 m (30 feet by 30 feet) with a 9 m by 5 m (30 feet by 16 feet) wing were erected.

3) An Ingersoll-Rand 460 cubic foot compressor and a 50-horse power boiler were on the site and were being installed.

Buildings that were on the site included: a cookery, a bunkhouse, an assay office, a blacksmith shop, an office building, a garage, a horse stable, and a powerhouse. Construction work ceased temporarily in 1935 (Sinclair *et al.* 1936).

In 1936, the average payroll consisted of four men per month. The assay office was equipped, and the 50-horse power boiler was installed. A 25-ton amalgamation mill was under construction with the purchase of a Tremaire two-stamp unit, but a 75-ton crusher and a 60-ton bin were erected and installed. Shaft timber was cut, and the shaft was framed, but no underground work was done, as underground development was planned in 1937 (Sinclair *et al.* 1937).

No underground work was done in 1937. Buildings erected during the year consisted of another bunkhouse, a mill-house, and a crusher-house to house the 25-ton amalgamation mill purchased in 1936. Only three men were employed (Sinclair *et al.* 1938).

At the end of 1937, and during the early part of 1938, the company apparently exhausted its funds and was attempting to get financing through a promoter. Erie Canadian Mines Limited attempted to get an option on the property in 1938, but negotiations apparently failed and no agreements were formally contracted (Sinclair *et al.* 1938, 1939).

In 1938, the property was apparently acquired by Phillip Bliss Cameron whose will subsequently transferred the ground to Mildred U. Johnstone and Kenneth Guy Cameron. The latter two partners are currently paying taxes for the following patented claims: KK503, KK505, KK997, KK998, K1038, KK1045, KK1049, KK1073, KK1700, KK2171, and KK2150, as well as KK2385 around the Wascanna Prospect (18).

General Geology

The geological interpretation of the area around the property is based on the examination of available outcrops and a compilation of other company information. A geological map and plan of the property is given in Figure 14.

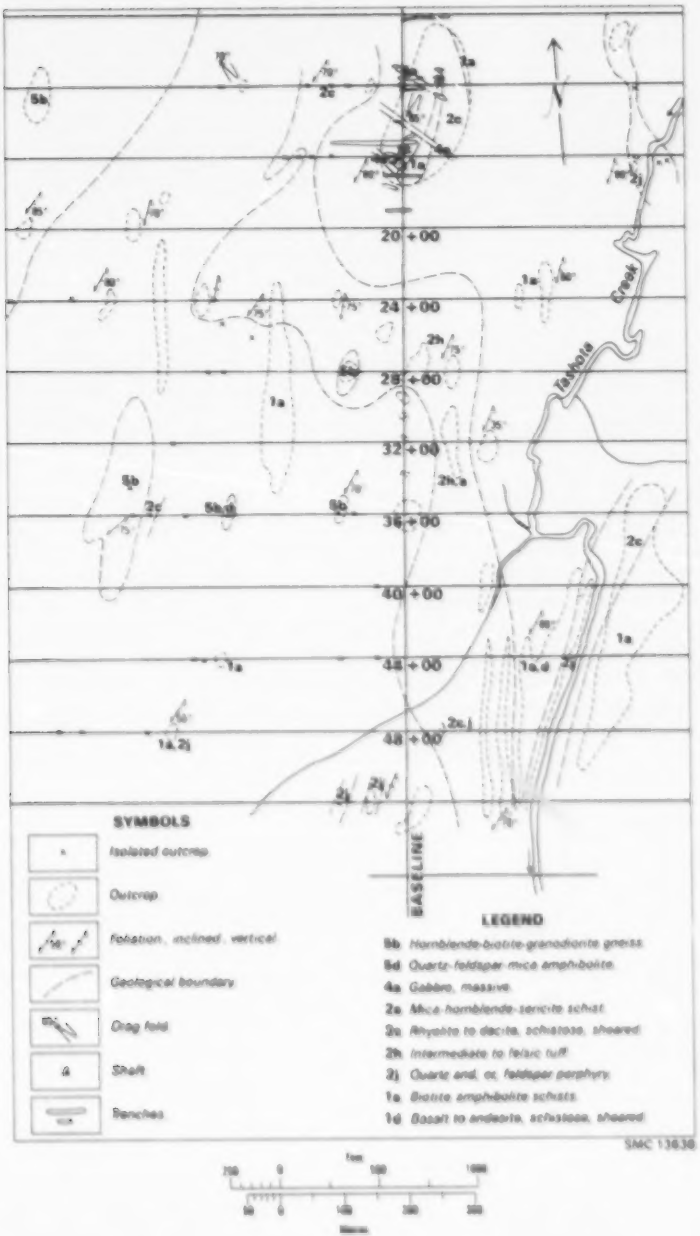

Figure 14–General geology about the Edge Lake Gold Mines.

The area is underlain predominantly by highly schistose pillow lava that has been intruded by quartzofeldspathic dikes. The above rocks are interbedded with narrow bands of ferruginous sedimentary rocks that are associated with the unexposed iron formation.

KENNCO EXPLORATION (CANADA) LIMITED [1952]

In 1952, this company conducted an airborne magnetometer survey over a large area including part of the present map-area. Three autopositive airborne magnetometer maps are filed in the Toronto Assessment Files Research Office, Ontario Ministry of Natural Resources, Toronto, number 63.2900. The results of the Tashota autopositive map, are similar to Aeromagnetic Map 2137G, the Elbow Lake Sheet (ODM-GSC 1963a). No other records of work done by this company in the present map-area are available.

LAKE STE. MARIE OCCURRENCE

Although this iron-gold deposit was not located by the author or his assistants, Hopkins (1917, p.224) described it as follows:

Lake St. Marie Deposit

A wide Iron formation band of varying strike and dip occurs in the rhyolites around lake St. Marie, which is two miles [3.2 km] to the southeast of Redmond station. The rocks have been greatly brecciated, permitting the circulation of sulphide solutions. Within 100 yards [90 m] of the northeast shore of the lake, trenching has revealed a pyrite band three feet [0.9 m] in width. A chipped sample across three feet [0.9 m] yielded, on assay, 31.3 per cent of sulphur and $2.40 of gold to the ton. There was not enough work done to disclose the extent of the deposit.

D. LOW (9)

In 1973, Dennis Low staked a total of 10 unpatented claims in Oboshkegan Township between Nowland and Oboshkegan Lakes claim groups which belong to Noranda Exploration Company Limited (14). The claim group is underlain by schistose mafic metavolcanics. No information on work done is filed with the Ministry of Natural Resources.

A.B. MACMORINE (10)

A.B. MacMorine is paying taxes for two patented claims numbered KK14 and KK15, totalling 31.8 ha (78.7 acres), and located just south of Hendrickson Lake in Oboshkegan Township. The original patent of these claims was granted to Frank Hendrickson on October 16, 1922.

History

Hendrickson's gold discovery (KK15) was one of the many prospects discovered as a result of extensive exploration following the 1915 Wells ("Tash-Orn Prospect") discovery at Tashota (Gledhill 1925). This discovery was first described by Hopkins (1917), and subsequently by Gledhill (1925) and Kindle (1931).

On September 4 and 5, 1946, J.W. Ambrose (Assessment Files Research Office, Ontario Division of Mines, Toronto) visited the claim group probably with senior staff members of Pardners Mines Limited (that is Cyril Jerrom and Guy Lowe) to study the possibility of an option of the ground. A report based on this visit was presented to the company.

According to J.W. Ambrose (1948, *in* Assessment Files Research Office, Ontario Division of Mines, Toronto):

> Subsequent to his report (March 1948) 654.6 m (2,147.5 feet) of diamond drilling were done in six holes.

This work was apparently done to test the gold potential of the Hendrickson discovery.

In 1947, Pardners Mines Limited held a group of 50 claims, with a total of approximately 800 ha (2,000 acres). Claims KK14 and KK15 were patented and probably optioned from Frank Hendrickson, and the remaining 48 other claims were unpatented and staked by the company. The claims surrounded Hendrickson Lake within Oboshkegan Township, and the Metcalfe Lake area, and were located just 8 km (5 miles) south of the main Canadian National Railway line.

In February and March 1947, a magnetmometer survey was conducted on the company's ground by Variometer Surveys Limited. Diamond drilling followed this survey, and six diamond-drill holes totalling 84.7 m (278 feet) were collared on two sulphide (pyrrhotite) zones on claim KK15 (Assessment Files Research Office, Ontario Divison of Mines, Toronto).

Although four additional diamond-drill holes totalling a minimum of 300 m (1,000 feet) were recommended, no further work seems to have been done, and the ground probably lapsed. At present, the only ground held consists of the two patented claims KK14 and KK15 owned by A.B. MacMorine.

General Geology

A few large outcrops occur south and east of Hendrickson Lake. These outcrops consist of pyroclastic breccia, rhyolite-quartz eye porphyry, and tuff-breccia. Massive and pillowed mafic metavolcanics are exposed to the south and north of Hendrickson Lake and enclose the felsic fragmental rocks. Intruded into the metavolcanics of the area are two varieties of gabbro: a massive, medium- to coarse-grained hornblende gabbro, and a porphyritic ('leopard') gabbro which is medium to fine grained. Feldspar porphyry, lamprophyre, and diabase dikes were also intersected by diamond drilling.

Economic Geology

The pyrrhotite zones outlined by geophysical surveys and diamond drilling are known to be auriferous, especially where exposed in claim KK15, the original Hendrickson discovery (Hopkins 1917). The pyrrhotite zones occur as lenticular concentrations, some of which may be more than 300 m (1,000 feet) long, and up to 30 m (100 feet) wide (Assessment Files Research Office, Ontario Division of Mines, Toronto), and occur in the coarse felsic fragmental rocks.

D.M. MCPHAIL *et al.* (11)

Duncan M. MacPhail, Murdoch Ross, and Duncan M. MacLeod, are joint owners of the leased claim TB2700, 16.0 ha (39.5 acres) in area, and located about 1.6 km (one mile) northeast of North Ridge Lake. Surveyed claims KK2220-KK2222 originally leased by Joseph E. Peterson and partners in 1938, and now cancelled, are located immediately to the north of this claim. No record of work conducted on these claims is available.

R. MIDDAUGH (12)

During the 1973 field season, Richard Middaugh restaked 21 formerly patented claims that were cancelled by the Patentor and hence open for staking. His claims numbered TB351533 to TB351553 inclusive, and covered the ground formerly leased as KK3116, KK3147, KK3055 to KK3065 inclusive, KK3068, KK3070 to KK3071, KK3076 to KK3077, and KK3080 to KK3082 all inclusive. The patented claims were originally granted to Agnes G. Fairfield and partners on September 20, 1945, and are located north of Knucklethumb Lake and south of Wells Lake in Oboshkegan Township. No record of work conducted on the claims is available.

R.J. NOFFKE (13)

Eleven patented claims numbered KK2223, KK2224, KK3144, KK3145, KK3146, KK3262, KK3263, KK3264, KK3265, KK3266, and KK3267, totalling 192.6 ha (476.73 acres), and located south of Hull Lake are now owned by R.J. Noffke of Ottawa. The original patents of these claims were granted to Agnes Fairfield on March 13, 1947.

The ground includes the "Kipper-Cameron Gold Prospect", which originally consisted of four mining claims, KK2200, KK2223, KK2198 and KK2199. By 1933, the property consisted of claims KK2223, KK2224, KK2968, and KK2969, and was referred to as the "Kipper-Cameron Hull Lake Property". An extensive amount of surface work was performed on this property with apparently encouraging results that prompted Coniagas Mines Limited to sample it in detail (As-

sessment Files Research Research Office, Ontario Division of Mines, Toronto). No option agreement was apparently negotiated, and by 1942 the exploration arm of Sylvanite Gold Mines Limited was attempting to get a working option from P.B. Cameron, then senior owner of the ground. This attempt also apparently failed to materialize, and it is not known when the ground was acquired by R.J. Noffke (Assessment Files Research Office, Ontario Division of Mines, Toronto).

Evidence in the field indicates that an extensive amount of diamond drilling was conducted, but the results of this work are unavailable. Geochemical and rock sampling have been continued by the current owner (R.J. Noffke, personal communication, 1973).

The geology of this ground was described by Gledhill (1925) and Kindle (1931) who observed that the location of:

> ...the (gold) mineralization is along a shear zone at the contact of "Keewatin greenstone" (mafic metabasalts) and quartz prophyry [lapilli-tuff to pyroclastic breccia]....

Gledhill (1925) and Kindle (1931) failed to recognize the fragmental nature of the "quartz porphyry".

NORANDA EXPLORATION COMPANY LIMITED (14)

During the later part of the summer of 1972, Noranda Exploration Company Limited contracted Questor Surveys Limited to conduct an airborne, geophysical, electromagnetic and magnetic survey covering the Tashota–Onaman–Kowkash area. In the fall of 1972, and in the 1972/73 winter a total of 156 claims were staked to procure the ground on which numerous favourable airborne geophysical conductors were located. These were referred to in groups as: 1) Dyer–Hendrickson Lakes Group (4 claims), 2)North Brennan–Metcalfe Lakes Group (19 claims), 3) Hendrickson Lake Group (5 claims), 4) Hull Lake Group (4 claims), 5) Crescent Lake Group (19 claims), 6) Oboshkegan Lake Group (78 claims) and 7) Nowlan Lake Group (27 claims). This property covers ground of the former Pardners Prospect, see "MacMorine, A.B. (10) and Lake Ste. Marie Occurrence".

Following line cutting, detailed ground geophysical surveys, geological-geochemical mapping and sampling were conducted on all, if not most of the groups. At the time of writing no results were known and work for assessment credit was not available.

Candela Development Company Limited, a wholly owned subsidiary of Freeport Sulphur Limited, was incoporated in 1951. In 1953 it obtained a working option on 13 non-patented claims, "The Peterson Property", located approximately 2.4 km (1½ miles) southeast of Redmond Station, around Crescent Lake, Oboshkegan Township. Assessment data (Assessment Files Research Office, Ontario Division of Mines, Toronto) only summarized diamond drilling results from two holes totalling 266.4 m (874 feet). However, a picketed grid consisting of a baseline and wingline and covering part of the property was observed in the field by the author, and indicates that the diamond-drill holes were probably drilled to test a geophysical target. Diamond-drill hole No. 1, located on the northern shore of Crescent Lake with a bearing of S75°E and an inclination of

minus 45° was collared on a porphyritic rhyolite volcanic breccia, but intersected quartzite (iron formation) from a depth of 120.4 m (395 feet) to the end of the hole (167.3 m; 549 feet). Near the contact between the felsic fragmental rock and the quartzite, approximately 10.7 m (35 feet) of disseminated to massive pyrrhotite and pyrite, averaging 18.88 percent sulphide minerals were intersected. Hole No. 2, bearing S65°E, inclination minus 45°, was located on the southeastern shore of Crescent Lake. It was collared on sheared, porphyritic felsic volcanic breccia (possibly contorted, sheared, quartzite(?)). Quartzite (iron formation) was intersected between 47.5 and 53.3 m (156 and 175 feet) and averaged 18.28 percent pyrrhotite and pyrite. The hole ended in the quartzite. No valuable minerals were found, and the option was apparently dropped in 1954. Noranda Exploration Company Limited presently holds the ground.

PAULPIC GOLD MINES LIMITED (15)

Paulpic Gold Mines Limited has leased 16 claims 298.1 ha (737.85 acres) in the Tashota Station area, up to July 1, 1991. The lease was granted on July 20, 1971 for a period of 21 years. Included in this ground is the Cline Prospect (KK61) which was first described by Hopkins (1917), and was also mentioned by Gledhill (1925) and Kindle (1931).

History

The "Cline Prospect" is a gold discovery which was found following Well's 1916 find in the Tashota gold camp (Gledhill 1925). Hopkins (1917, p.221) stated:

> In 1917 the Tash-Orn Mines Ltd., who had optioned the claim, sank an inclined shaft to a depth of 48 feet [14.6 m] on the deposit and bored a diamond drill hole, 165 feet [50.3 m] in length, at an angle of 45 degrees towards the deposit.

By 1925 the shaft, which is located southeast of No. 4 post of KK61 had apparently been deepened, and was then at a reported depth of 18.3 m (60 feet) according to Gledhill (1925, p.84). No work has been done since that time (Kindle 1931) but the lease of this claim was granted to P.E. Hopkins on November 12, 1941. Paulpic Gold Mines Limited apparently obtained the lease of the prospect after the old Hopkin's lease was cancelled on October 2, 1961.

According to A.P. Hopkins (personal communication), Paulpic Gold Mines Limited was formed and controlled by P.E. Hopkins and partners. The original leases were granted to P.E. Hopkins as follows: KK328, KK417 (July 21, 1938); KK2206, KK2219 (November 24, 1938); KK2389, KK2390 (May 30, 1940); KK2441 (July 25, 1940); KK2576 (May 13, 1941); KK2693, KK2691, KK2689 (August 13, 1942); KK2726, KK2727 (October 22, 1942); and KK2973 (May 13, 1944). These claims were renewed every ten years except for claims KK2689, KK2691, and KK2726, which were cancelled by Arnon W. Burt on October 18, 1962 and apparently returned to Paulpic Gold Mines Limited after that date.

Claims KK2219, KK2389, KK2390, KK2391, KK2441, KK417, KK328, KK61, and later KK2296, KK2692, and KK2693, were optioned by Hopkins, Johnson and Burt, but are filed under the name of Tom Johnson Nipigon Mines Limited (Assessment Files Research Office, Ontario Division of Mines, Toronto). In the latter part of June 1936, Tom Johnson Nipigon Mines Limited hired Erie Canadian Mines Limited to conduct work on the optioned ground (Assessment Files Research Office, Ontario Division of Mines, Toronto). Surface trenching was carried out by Erie Canadian Mines Limited between June and October, 1936. In addition, diamond drilling was started on October 20, 1937, and was continued until February 20, 1937. During that period, a total of 50 diamond-drill holes were collared totalling 2058.3 m (6,753 feet) on claims KK328 and KK61. This work indicated 30,000 tons of $7.00 grade gold "ore" (1936 price). It is not known when the ground was returned to or transferred to Paulpic Gold Mines limited after this work was done.

General Geology

The "Cline Prospect" is located in the Early Precambrian (Archean) metabasaltic schists that are cut by diabase dikes. The geology of the property was exposed by deep trenching, and was then investigated by Gledhill (1925, p.84) who wrote:

> The rocks on KK61 near Tashota consist of sheared greenstones and a sediment resembling banded iron formation (revealed by deep trenching). This sedimentary rock (which is four feet [1.2 m] wide) is made up of fine (alternating) bands of silica and magnetite and in places pyrite instead of magnetite. Some bands consist of fibrous amphibole....The greenstone schists dip northeast at 60° and strike northwest.

The Paulpic property is covered by swamp. But surface trenching and diamond drilling of 1936-37 indicated that the country rocks consisted of mafic metavolcanics and derived schists in assocation with a gold-bearing siliceous Iron Formation in the form of *en echelon* lenses. These rocks are cut by diorite, lamprophyre, porphyries, and quartz veins.

Economic Geology

The type of mineralization in these deposits can be characterized as gold-bearing Iron Formations.

The "Cline Prospect" was not located by the field party, but was described by Gledhill (1925, p.84) who reported:

> The banded rock has been impregnated with gold-bearing solutions. The greenstones show much shearing action and the mineralized quartz veins have well-defined walls.
>
> Visible gold was seen in the oxidized banded rock composed of magnetite and silica (with occasional pyrite).

A 60-foot [18 m] shaft (was sunk) on a quartz vein reported to be four to five feet wide at the bottom of the shaft....Good gold pannings were obtained from the oxidized cap overlying the mineralized rock.

For the Paulpic Property, A.P. Hopkins (1945, private files) has reported that:

10,000 feet [3000 m] of diamond drilling has indicated about 30,000 ton of $7.00 grade (ore) - [gold price at $38.30 in 1945] of gold-bearing siliceous Iron Formation in the form of lenses *en echelon* above the 250 foot [76 m] horizon.

The known tonnage referred to above is calculated from several "ore" zones outlined by surface trenching and drilling (Assessment Files Research Office, Ontario Division of Mines, Toronto) and were designated: The Fraser Vein, New Vein, Trench No. 1 veins, and, "Iron Formation west of the Fraser Vein" (Assessment Files Research Office, Ontario Division of Mines, Toronto).

The "Fraser Vein" was traced for 99.0 m (325 feet) with a strike of N45°W and a dip of 65°NE. The 99.0 m (325 feet) strike length and 2.0 m (6 feet 7 inch) width with a gold content of $5.70 per ton (1936 price) (Assessment Files Research Office, Ontario Division of Mines, Toronto) 18,145 tons of "ore" valued at $103,426.00 for every 30 m (100 feet) in depth was calculated for the Fraser vein, which also carried pyrrhotite, pyrite, and chalcopyrite in trace amounts. The tonnage of the calculated "ore" of the Fraser vein was supplemented by that of the "Ore Zone West of the Fraser vein", approximately 15 m (50 feet) west (Assessment Files Research Office, Ontario Division of Mines, Toronto).

The "New Vein" was traced for a length of 20 m (70 feet) with an average width of 1.11 m (3 feet 8 inches) and a grade of $17.25 per ton (1936 price). However, in a section of the vein 15 m (50 feet), in length and 1.2 m (4 feet) in width and 30 m (100 feet) in depth, the gold value runs to $10.00 per ton (1936 price). Three metres (10 feet) east of the New Vein, a "rich" shoot 1.2 m (4 feet) wide intersected to approximately 12 m (40-foot) vertical depth, returned $22.75 per ton (1936 price).

The "Trench No. 1 Veins" exposed by the trench are made up of two short "ore shoots" separated by a diorite/gabbro dike. One of the "shoots" is exposed for a length of 10.7 m (35 feet) with an average width of 2.4 m (8 feet) and with a gold content of $9.70 (1936 price). Five diamond-drill holes intersected this zone to a vertical depth of 12 to 15 m (40 to 50 feet) with maximum gold content of $5.95 per ton (1936 price) with minor pyrite, pyrrhotite and chalcopyrite. The other "ore shoot" in Trench No. 1 was exposed for a length of 18 m (60 feet) and a width of 0.9 m (3 feet) averaging $24.00 per ton gold (1936 price) also with minor pyrite, pyrrhotite, and chalcopyrite. Two diamond-drill holes intersected this zone to a maximum vertical depth of 9 m (30 feet), and a maximum width of 2 m (8 feet) with gold values up to $8.56 per ton (1936 prices).

The "Iron Formation west of Fraser Vein" (A.P. Hopkins, personal files) was tested by a considerable amount of diamond drilling which outlined an auriferous band of Iron Formation 90 m (300 feet) west of the Fraser Vein containing quartz, and magnetite in addition to gold, pyrite, pyrrhotite, and some chalcopyrite. Diamond drilling outlined a zone, 90 m (300 feet) in length, with an average width of 1.4 m (4 feet 8 inches), and a gold content of $3.94 per ton (1936 price).

The above information is derived from a report of J.D. Wright of Erie Cana-

dian Mines Limited on the Johnson Tashota Property and filed in the Regional Geologist's Files, Ontario Ministry of Natural Resources, and from private personal files of A.P. Hopkins (personal communication, 1973).

PHELPS DODGE OCCURRENCES

During 1970, Phelps Dodge Corporation of Canada Limited staked two claims in the middle of Dyer Lake, probably to cover airborne geophysical conductors.

Two diamond-drill holes A1 and 2, totalling 56.7 m (186 feet) were drilled in the southeast corner of claim TB242960 between October 7 and October 23, 1970 (Assessment Files Research Office, Ontario Division of Mines, Toronto). No encouraging results were apparently recorded, despite favourable geological environment (felsic lapilli-tuff), and the ground was eventually allowed to lapse.

J.J. PICOTTE (16)

Claims KK2173, KK2174, KK2172, KK2201, KK2202, and KK2779 totalling 98.29 ha (242.93 acres), are currently on lease to Julien J. Picotté up to January 1, 1978 (first five claims listed above) and December 1, 1974 (last claim listed above). The original leases were granted to Joseph A. Picotté on December 4, 1937 (KK2172, KK2173, KK2174), January 3, 1938 (KK2201, KK2202) and that of KK2779 was granted to Julien J. Picotté on January 20, 1955. The claims are located next to and adjoining to the northeast side of Paulpic Gold Mines Limited property (15), about 1.6 m (1 mile) northeast of Tashota Station.

There is no record of work performed on the property.

H. SCHMITT (17)

Harry Schmitt owns four non-patented claims numbered TB351846 to TB351849 inclusive, and located just south of Slate Lake in Oboshkegan Township. No record of work conducted is filed with the Assessment Files Research Office, Ontario Division of Mines, Toronto.

WASCANNA PROSPECT (18)

The Wascanna prospect was developed from the Tash-Orn ("Wells") prospect. Test gold ore was shipped during underground development, see section on "P. Brightman" property (1) for a complete account.

J.W. WEST AND L.H. WEST (19)

The will of Thomas A. Jones transferred claim KK416, 20.05 ha (49.64 acres) to James and Lewis West who have the lease of the claim in good standing up to October 1, 1977.

The claim is located just south of the Canadian National Railway tracks at Tashota Station, and covers the old Tashota gravel pit. The original lease of this ground was granted to Sarah Cashback on November 8, 1937.

W. YZERDRATT (20)

W. Yzerdraat holds 18 claims numbered TB337587 to TB337590, TB349659 to TB349668, and TB352397 to TB352400 all inclusive, and located around McDonough and Metcalfe Lakes. W. Yzerdraat has performed detailed surface exploration on his ground with apparently no encouraging results.

RECOMMENDATIONS TO PROSPECTORS

According to Ridler (1973) and Sangster (1972), metalliferous deposits occur close to, or adjacent to eruptive centres in exhalite and submarine environments. Sangster (1972, p.2) specified the mine areas as being defined by "mill rock" or coarse pyroclastic rocks. Sangster (1972, p.3) further stated:

> ...in most cases, more than one-third of the pyroclastic fragments (in the mining camps) are of block-size or larger (greater than 64 mm). This rock would therefore be termed a tuff-breccia or pyroclastic breccia according to the classification of Fisher (1966)....With diminution of fragment size, "mill-rock" grades laterally into lapilli-tuff or tuff...."Mill-rock" can be found within one half-mile [0.8 km] of most Precambrian massive sulphide deposits....In addition to "mill-rock", quartz porphyry is a common host to or close associate of these ores and in many areas the geologist has difficulty in deciding whether the porphyry is extrusive or intrusive....Rocks which are transitional between the "pure" volcanics and "pure" sediments....constitute the next most common host rock of massive sulphide ores after acid volcanics....These rocks, as a rule, exhibit better, and laterally more persistent, layering than do the true volcanic rocks...They contain deposits which generally show pronounced layering [Bedding?].

Such a rock sequence is represented in the Tashota area except that "transitional" rocks are not common. This area would, therefore, appear to be an attractive area for exploration.

Interesting, but apparently untested mineralization was mapped on the outcrop at the tip of the southwestern shore of Gzowski Lake. In this area a partly altered hornblende quartz monzonite (part of the Elbow Lake Stock) contains minor amounts of visible chalcopyrite. The mineralization was visible only in one part of the outcrop measuring 76 by 30 m (250 by 100 feet), which was notably permeated with quartz veinlets. Disseminated chalcopyrite was also found in another outcrop 460 m (1,500 feet) to the northeast. The samples submitted to the Mineral Research Branch, Ontario Division of Mines, contained only trace amounts of copper, but the area may contain porphyry copper deposits (see the

subsection on "Copper"). This area is recommended for further prospecting and other reconnaissance exploration methods in order that the extent of this mineralization can be determined.

Another geologically favourable area is located in the central part of the map-area, 1200 m (4,000 feet) southeast of Hull Lake and 1200 m (4,000 feet) west of Knucklethumb Lake. This area is several hundred feet southwest of the Number 2 post of the surveyed claim KK3264, and consists of a highly weathered (gossan) porphyritic and sheared sericite schist derived from a felsic tuff-breccia (sample A197-2), and contains pyrite (over 5 percent), pyrrhotite (less than 1 percent), and sericite. Results of assays on selected grab samples collected by the author, as determined by the Mineral Research Branch, Ontario Division of Mines, indicated trace amounts of gold, tin, lead, chromium and titanium; one sample returned assays of 0.23 percent copper and 6.19 ounces per ton of silver. Numerous other sericite schist gossan zones derived from coarse felsic fragmental rock have previously been trenched in the area north and northeast of Knucklethumb Lake in the search for gold. This area is still attractive for base-metal exploration.

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